

MEASUREMENT AND
ADJUSTMENT SERIES
EDITED BY LEWIS M. TERMAN

MENTAL TESTS AND THE CLASSROOM TEACHER

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Scientific method in education involves the careful measurement of each child's ability to learn and of the amount that he has learned. It also involves adjustment of organization, subject matter, and methods of instruction to the varying needs and abilities of pupils. This book is one of a series that sets forth the value, technique, and applications of educational measurement and adjustment. It describes the varied uses of tests in grading, classification, educational guidance, and the improvement of teaching in a large school system

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PREFACE

FIVE years ago mental testing was almost unknown in the public schools except in a few cities in which tests were made to discover those who were mentally defective for placement in a special class. Now the movement has grown to immense proportions. Hundreds of thousands, if not millions, of school children are being tested annually. Schools in almost all large cities and in many towns and country districts are making extensive use of mental test results. It is but natural that a movement that has grown so rapidly and that deals with a problem so intangible as the measurement of intelligence should be mismanaged at times. It has been misinterpreted and misunderstood. Extravagant claims have been made about what could be done by means of the tests. Mental tests and individual differences in intelligence are subjects of common discussion. Newspapers and magazines have contributed hundreds of articles, and the lay public has been aroused by lectures on "applied psychology." Teachers are using tests, and often on the basis of a single test are making decisions that may seriously affect the life of a child. What is a reasonable attitude for the teacher to take? What use can she make of the tests? What cautions should she observe? The newness of the field, the imperfections of tests, the multiplication of test methods, the credulity of some people and the suspicion of others regarding the value of tests, the rôle tests are capable of playing in the organization or disorganization of a school system — these facts demand that teachers be instructed in the use of tests and be cautioned concerning the dangers involved.

The author has pointed out what he believes to be a safe and sensible path for the teacher to take. The advice given is based upon extensive experience in the use of tests in

school systems enrolling hundreds of teachers and thousands of children.

This book is written primarily for teachers. However, it should prove a helpful guide to principals, supervisors, and school administrators in general. It is planned for use in teachers' reading circles and for normal school and college classes in mental testing. The contents of each chapter have been arranged in topical form for clearness in class use. Technical terms have been avoided. Only sufficient data are presented to show a scientific basis for the attitude taken. At the close of each chapter is a selected bibliography. No effort has been made to make this exhaustive; only a few references have been listed, and these are of a kind that even the busy teacher may well take time to read if she wishes to make more extensive study along the lines suggested by the chapter.

It has not been the aim of this book to present the technique of giving and scoring tests; this can be readily obtained from the manuals that have been written for each set of tests. The purpose of the book is to show (1) Why mental tests are needed, (2) What they are like, (3) How they can be made most useful.

To Elise H. Martens, assistant director of the Bureau of Research and Guidance in Oakland, the author is indebted for untiring assistance in the preparation and revision of the manuscript of the entire book. Mr. John K. Norton assisted in outlining the plan of the book and in the writing of Chapters III and IV.

VIRGIL E. DICKSON

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EDITOR'S INTRODUCTION

It is the belief of the editor that few educational books have appeared in the last two decades as significant as Dr. Dickson's *Mental Tests and the Classroom Teacher*. Certainly it is by far the most helpful treatment to date on the practical use of intelligence tests in the schoolroom. It fills a need that has become very obvious and very urgent. All will admit that the testing movement which is now sweeping the educational world is much less fruitful of practical results than it ought to be. The merit of Dr. Dickson's book is that it interprets this movement in terms of everyday classroom practice.

The author's experience as a public school teacher, as a trainer of teachers in a normal school, as a city superintendent of schools, and finally as director of research and guidance in two large city school systems, has given him a grasp of the educational situation that has made it possible for him to give a balanced treatment of the entire subject. His book will appeal equally to superintendents, principals, classroom teachers, and students of education. It should dispel the last lingering doubt in any unprejudiced mind as to the value of intelligence tests in the educational program.

The success of the author's treatment is due largely to the fact that it is based upon a wealth of experience rather than upon plausibly formulated theories. In fact, Dr. Dickson's experience in the educational use of test results has probably been more extensive than that of any other living educator. One of the first to institute an extensive testing program in the schools, he was the very first to make such a program the basis of a thoroughgoing reclassification of children for purposes of instruction. The net results of all this experi-

ence have here been set forth in a simple and straightforward style that evidences a rare ability to organize and present material in a way to make it comprehensible, convincing, and helpful to all classes of teachers.

Especially characteristic of this book is its sanity. The reader will quickly sense the fact that the author has viewed his subject from every angle. He is not one of those who believe in the infallibility of intelligence tests or in their adequacy when used as the sole basis of classification. He points out frankly the possibilities of error in test results and the dangers that are sure to follow from their rash or ill-advised use. In view of the author's unequaled experience with tests his words of caution along this line should carry very great weight. In the school systems of Oakland and Berkeley he has shown how it is possible to test and reclassify fifty thousand school children without arousing the slightest opposition on the part of parents, teachers, or the community at large. He has accomplished this by the use of professional judgment and common sense, not by skillful advertising or persuasive eloquence.

One of the author's most important contributions is to show that the differentiation of curricula and the classification of school children according to ability, far from being undemocratic measures, are absolutely essential if the public school is to be made a real instrument of democracy. He rightly holds that it is as unjustifiable and dangerous for the educator to prescribe the same educational treatment for all as it would be for a physician to prescribe the same medical treatment for all. He holds that true democracy does not rest upon equality of endowment, but upon equality of opportunity. This equality of opportunity is something the schools have hitherto in a measure withheld. Reclassification of children and differentiation of courses of study along the lines laid down in this book will go far toward insuring

that every pupil, whether mentally superior, average, or inferior, shall have a chance to make the most of whatever abilities nature has given him.

The educational significance of intelligence testing is so far-reaching, both for classroom practice and for school organization, that Dr. Dickson's authoritative treatment of the subject deserves to be studied by every teacher and by every school administrator in the United States. It should also appeal strongly to women's clubs, parent-teacher associations, and other groups interested in education.

LEWIS M. TERMAN

MENTAL TESTS AND THE CLASSROOM TEACHER

CHAPTER ONE

SOME SIGNIFICANT TRENDS IN AMERICAN EDUCATION

Three periods in the development of public education in America. In order to work intelligently with problems confronting us in the public schools of today, it is necessary to have before us some of the facts concerning the development of the school as a public institution in America. From the earliest colonial times to the present, there have been three rather distinct changes in our general conception of the place and purpose of education.

During the first of these periods education was confined largely to private instruction given to those able to pay for it. Such was the case in this country as a whole until the middle of the nineteenth century. The second period saw the acceptance of the idea of free public schools for all children who wished to attend. Voluntary education at the expense of the state became the current practice of most of the Northern states by 1850. The third period, that of today, is characterized by a general acceptance of the principle of compulsory education. All children who are physically and mentally fit must attend free schools or furnish evidence of equivalent training obtained elsewhere. Effective operation of compulsory education has developed in the majority of states only within the last quarter of a century.

Education first a luxury, then a privilege. In colonial times education was mainly for the few who desired it in order to prepare for the clergy, or for children of wealth whose parents had a certain standard of culture to maintain. For the latter, education was a luxury rather than a necessity. Naturally, under such conditions, the school was recruited

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almost entirely from the superior classes, and those who were not mentally capable were quickly left by the wayside as unprofitable subjects. Soon, however, the fact that religion was regarded as a personal matter for each individual to consider for himself began to have its effect on education. If each person is responsible for his soul's salvation, then each should know his Bible. Every one, therefore, should know how to read. This religious point of view had a profound effect in bringing about the change permitting all children to attend a public school. Agitation for public taxation for schools for all the children was fought bitterly during the first half of the nineteenth century. Those who opposed free schools usually advanced the idea that citizens who had no children to educate should not be held responsible for the education of other people's children. Jones would say, "You might just as well demand my plow to plow Smith's field as take my money to educate Smith's children." However, one state after another was added to the list offering free public schools, until, by 1850, these had spread throughout the North. Soon after the Civil War they became general throughout the South also.

Education becomes a duty. The third period came as a logical and inevitable development from the second. Once education had been recognized as so necessary to public welfare as to justify taking Jones's money to provide schools for Smith's children, it was an easy step to the conclusion that Smith has no right to keep his children out of school when free educational facilities have been provided for them. The citizens of a democracy need to be educated. Therefore Smith *must* send his children to school. "Every child has the right to an education," a right which takes precedence over any right the parent may have to the child's service at home. The rights of childhood must be protected by the society of which he is now a part, and in which he will soon

become a factor with voting power. Consequently one state after another changed the *permission* to attend the public school into an *obligation* to attend, until, by 1900, nearly all the states of the Union had compulsory education laws written upon their statute books. The execution of these laws, however, has proved difficult; for, until very recent years, a large body of the population has sought to evade them whenever for any reason it seemed desirable or profitable for their children to be kept at home or sent to work. As evidence of this difficulty it is only necessary to point to many complexities facing the attendance officers of almost every city and county in America, even at the present time.

The earlier compulsory education laws generally required attendance for only three or four months of the school year; furthermore, children under eight years and over twelve years of age were usually exempt. Development has steadily taken place, with the result that at the present time children are required in most states to attend school for the complete yearly session. The age limit likewise has been extended, particularly at the upper end, where it varies at present in different states from thirteen to sixteen years of age. Within the last decade some twenty states have taken a further step forward by passing compulsory "part-time" laws, which require children to attend school for at least a part of the time until the age of sixteen or eighteen years.

Changes in school organization. The development of a system of free compulsory education has brought about important changes in the mechanical organization of schools. In the days of exclusively private instruction the school-master taught all who were sent to him, each in accordance with his ability to master the work laid down in the textbooks. In time there developed the primary school and the grammar school, providing for a certain amount of differentiation among pupils according to age. When schools

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became free, the number of pupils in attendance was greatly increased. This brought the necessity of placing a larger number of children with one teacher, both for the purpose of saving expense and for reasons having to do with methods and with the gradation of textbooks. It seemed desirable to classify children in such a way that there might be more homogeneity with reference to age and ability to learn. For a time the classification was based chiefly on reading ability, pupils being designated as of the first-reader class, the second-reader class, etc.

By 1860 the modern graded system of schools had become general in the larger cities. A new type of school building had evolved in which there were many rooms and many teachers. It was found that school cost could be lowered by placing a large number of children of similar age and ability under one teacher. The school year offered the easiest and most natural division for pupils. Children who came to school for the first time were naturally placed in the first or receiving class. If they succeeded in the work of the year they advanced into the second class or second grade, and so our graded system developed, in general practice adopting eight grades. Since in most states the laws permit children to enter at six years of age, this graded system through a natural evolution has adapted itself to the education of children from six to fourteen years, who, theoretically, devote one year to each grade of school work.

Changes in the curriculum. In the colonial period the curriculum, especially in schools above the grammar grade, was classical. Education was either for culture or for preparation to enter the ministry. Later, as education became more democratic and brought in large numbers of children who were preparing for the more lowly occupations, demands arose for the introduction of other subjects. Hence decade by decade there has been a gradual evolution of the course

of study from reading and study of the Bible to the modern complex curriculum of the elementary school, offering a dozen or more different subjects and leading to the even more complex elective program of the modern high school. The subjects have been added in approximately the following order: ¹

Spelling	Elementary Science
Writing	Drawing
Arithmetic	Music
Manners and Morals	Physical Education
Bookkeeping	Sewing and Cooking
Grammar	Manual Training
Geography	Smith-Hughes Shop Work
History	

Development of the public high school. Along with the changes which have taken place in the organization and curriculum of the elementary school, has come the development of the public high school. The earliest approximation to secondary education in America was that which was received in the Latin grammar school of the New England states. Such institutions were established exclusively for boys, were aristocratic in type, and had for their main object the teaching of sufficient Latin to enable their students to enter college at fifteen or thereabouts. The curriculum was altogether classical. Later a tendency gradually developed, especially in the Southern colonies where commercial interests became predominant, to introduce more practical subjects. By the middle of the eighteenth century this demand for a practical curriculum gave rise to the American academy, usually open to girls as well as to boys, and offering a wider range of subjects, such as English literature and rhetoric, algebra, geometry, botany, chemistry, natural and moral philosophy, and debating. This movement spread rapidly, and by 1800 the new type of institution was fast taking the place of the old

¹Ellwood P. Cubberley, *History of Education*, page 756.

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Latin grammar school. During the first half of the nineteenth century its development continued, and it remained the leading type of secondary school until 1850.

First public high schools. The academy, however, was still of semi-private nature, supported in part at least by subscription or endowment, and managed under private boards of control. As the elementary school system became increasingly public in character and free to all the people, it was but natural that the same principle should in time be applied to secondary education. Such was actually the case, and as a result of the conviction that education should be entirely democratic, supported by the public and equally open to all, there was established in 1821 in Boston the first public high school in the United States. A period of intense struggle followed, arising from the difficulties accompanying increased taxation. Early state laws regulating the establishment of high schools were only permissive, and consequently, because of the cost of maintenance, communities were often in danger of abandoning a high school which had once been organized. Through the period of strife and struggle, however, the American public high school has come into its own throughout the country and is now providing the opportunity of secondary education for a steadily increasing percentage of American young people.

Other developments: kindergarten, junior high school. Following the growth of the eight-grade elementary school and the high school, two significant developments have come about to change somewhat the general practices in education; the first of these is the kindergarten, the second is the junior high school. The first public school kindergarten was established in 1873. In 1922 there were over nine thousand in the United States. In general these kindergartens are designed to care for children for one year prior to their entering the receiving class of the regular elementary school. The

junior high school movement has developed to large proportions only within the last ten years. Generally speaking, the junior high school embraces grades seven, eight, and nine, and has grown out of the need for variation in the course of study for pupils who have finished the first six years of the elementary school.

Basis of present curriculum. The present curriculum is based upon the theory that the course given in the first six grades covers the so-called tool subjects of learning; that these subjects are fundamental to the education of all children and should consequently be given approximately in the same degree to all children; that differences in aptitudes, interests, and life work should be recognized at about the age of twelve years; that the beginning of the junior high school program, therefore, should offer in the seventh grade a limited choice of subjects and courses; and that this elective program should be gradually increased as we go on up through the high school to the college or university.

Present conception of education. The prevailing conception of public education in America today involves, then, two fundamental principles: first, public taxation for the support of schools which will be free to all the children of all the people; second, compulsory attendance on the part of all children who are mentally and physically fit and who are not receiving equivalent education elsewhere. The purpose of the school is to train every child, and to train him in such a way as to give the best possible preparation for citizenship in a democracy. This purpose is clearly expressed in the following quotations:

To the educator for whom the problems of democracy are at all real, the vital necessity appears to be that of making the connection between the child and his environment as complete and intelligent as possible, both for the welfare of the child and for the sake of the community. John Dewey, *Schools of Tomorrow*, page 289.

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Purposive education for citizenship includes as one of its principal aims "so to shape the individual's appreciations, habits, insights, and ideals that to an optimum degree he will conform to the requirements of the various social groups in which he has membership."

David Snedden, *Sociological Determination of Objectives in Education*, page 254.

The social efficiency of a group of human beings depends upon recognizing the mental limitations of each one and upon so organizing society that each person has work to do that is within his mental capacity and that at the same time calls for all the ability that he possesses.

H. H. Goddard, *Human Efficiency and Levels of Intelligence*, page 127.

When we follow carefully the steps in the development of American education as outlined in this chapter and consider such statements as those just quoted from leading authorities in the educational world, we must conclude that the modern conception of education requires the careful study and adjustment of each individual child, regardless of whether he is being educated in a group of fifty children, or twenty-five, or ten, or even as an only child under a tutor's care.

SUMMARY

1. There are three rather clearly defined periods in the development of education in America: (1) the colonial period, in which education was for the select few who had the means to pay for it; (2) the period marked by the introduction of free schools provided by public taxation and open to those who wished to attend; (3) the period of compulsory education in which all children within certain age limits must attend school.

2. The introduction of free education produced a great increase in the number of children attending school, which in turn was largely responsible for changes in the construc-

tion of school buildings, in the classification of children, and in the organization of the curriculum.

3. The period of compulsory education, by forcing all types of children into the public schools, brought about still greater need for classification and for variation in the curriculum. All of these factors are involved in bringing about the present conception of the aim of education; i.e. that every child, of whatever capacity or probable destiny, shall be given such opportunity for development as will enable him to realize his best possibilities and satisfy the requirements of good citizenship.

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CHAPTER TWO

THE GRADING PROBLEM IN PRESENT SCHOOL ORGANIZATION

IN the preceding chapter we have presented a brief historical account of the changing conceptions of education in this country. Let us now examine some of the conditions existing in our public schools as they are organized at the present time. We shall limit the study to that portion of the field embraced in our public schools from kindergarten to the high school, inclusive, and shall not attempt to touch the problems of normal school, college, or university education.

THE ELEMENTARY SCHOOL

Variations in age and grade. It has been shown that the present grading system arose from the recognition of the fact that classification of pupils according to ability promotes economy and efficiency. However, surveys of public schools in many cities and many states of the Union prove conclusively that the current classification by grades still leaves wide variations in the age, in the accomplishment, and in the capacity of pupils who are working in the same grade.

Table 1 gives a picture of what the conditions were in the elementary schools of Oakland, California, in the school year 1919-1920. All the numbers inclosed within the heavy lines represent pupils who are at-age¹ for their respective grades; the numbers to the left and below the heavy lines indicate the children who are under-age for the grade in which they are working; those to the right and above represent pupils who are over-age. Of the first-grade pupils, 32.5 per

¹ A child is "at-age" who is in the grade in which his age would lead one to expect him to be; he is "under-age" if farther advanced in school than his age would lead one to expect; he is "over-age" if he is not so far advanced as he should be for his age. (See Table 1 and explanatory note.)

TABLE 1
NUMBER OF CHILDREN IN EACH GRADE BY AGES (Oakland Elementary Schools)

AGE GRADE	6½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12	12½	13	13½	14	14½	15	15½	16	16½	17	TOTALS
L-1	49	1050	773	359	171	76	31	24	8	8		2					2								2553
H-1		25	374	523	296	176	82	49	29	10	10	7	5	2	1		1	1							1591
L-2		4	87	472	526	292	190	105	58	25	15	7	3	5	2	2	2	2							1797
H-2		2	13	147	333	389	253	147	81	63	25	15	11	9	4	2	2	1							1498
L-3			1	16	93	362	357	277	172	125	69	27	15	8	1	3	6	4							1536
H-3																									1456
L-4				0	6	51	114	353	350	204	83	42	35	13	12	4	1	2							1068
H-4						6	32	166	276	316	210	148	98	53	46	42	19	15	9	2	1				1439
L-5																									1729
H-5																									1420
L-6																									1569
H-6																									1378
L-7																									1303
H-7																									1927
L-8																									1201
H-8																									1087
	49	1081	1248	1523	1434	1481	1350	1554	1357	1533	1921	1478	1396	1403	1333	1308	1100	936	674	439	341	121	60	26	24452

Table 1 shows the age-grade distribution of pupils in the elementary schools of Oakland, California, in the school year 1919-1920. Data were gathered in September. The heavy lines inclose the numbers showing pupils who are at-age for their respective grades; the numbers to the left and below the heavy lines represent pupils who are under-age for the grade; those to the right and above represent pupils who are over-age. 9.6 per cent of the pupils represented in the table are under-age; 45.4 per cent are at-age; 45.0 per cent are over-age. Two facts should be noted: first, the table does not reveal the complete distribution of pupils in the upper age groups because the high school grades are not included; second, the age-grade standard is more strict by one half year than that used by Ayres in *Laggards in Our Schools* and by several other writers.

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cent are old enough to be at-age for the second or even a higher grade; 44.3 per cent of the pupils in the third grade are old enough to be at least at-age in the fourth grade. Of the total number represented in the table, 9.6 per cent are under-age, 45.4 per cent are at-age, and 45.0 per cent are over-age for the grade in which they are located.

Grade distribution of children of a given age. If we examine Table 1 from another angle, we can see the range of grades in which children of each chronological age are located. For example, although the large majority of children six or six and a half years old are working in the low-first grade, there are also many of them in the high-first, some in the low-second, still others in the high-second, and one even in the low-third. It is instructive to follow the grade distribution for each age all the way across the chart. Table 2 presents some of the facts from Table 1 in summary form. Observe that children ten years old are found in every grade from the first to the seventh, inclusive, and that children of eleven, twelve, thirteen, and fourteen years are working all the way from the first grade to the eighth grade, inclusive. Oakland is a city which for several years previous to this report had been giving more than the usual amount of attention to the proper placement of children, and yet such wide variations in grade placement were found as noted above. Clearly, the ages of children do not furnish a very satisfactory basis for predicting the grade in which they are likely to be found.

Variation in progress. A study of the progress of children, based on the same report of the Oakland elementary schools, shows that there is a wide variation in the progress of children who attend school approximately the full time. By progress here is meant the rate at which the child moves forward through the grades, regardless of age at entrance. If progress is normal, the child completes one grade for each year that he attends school. Table 3 (page 14) shows the per cent

TABLE 2
RANGE OF GRADES IN WHICH CHILDREN OF A GIVEN AGE ARE
WORKING (Oakland Elementary Schools)

AGE IN YEARS	GRADES IN WHICH FOUND
6	1 to 3
7	1 to 4
8	1 to 5
9	1 to 6
10	1 to 7
11	1 to 8
12	1 to 8
13	1 to 8
14	1 to 8
15	4 to 8
16	5 to 8
17	6 to 8

Table 2 shows the range of grades in which children of each age were found working in the Oakland elementary schools, 1919-1920. Read the table thus: Children six years old were found in the first to third grades, inclusive; children seven years old in the first to third grades, inclusive; etc.

of pupils in each grade during the school year 1919-1920 who were making slow, normal, or rapid progress. Before the first grade was completed, 26.1 per cent of the children had failed of promotion in the low-first or high-first or both; before the fifth grade was completed 45.2 per cent had failed one or more times. On the other hand, there were a number of children in each grade who were able to gain time and make promotion before the end of the term, while others were advancing at the regular rate of one complete grade each year. Evidently the fact that a child enters the first grade at the age of six years or thereabouts does not indicate that he will complete the elementary school in exactly eight years.

These conditions universal. That these facts with regard to variation in the age and progress of children in our elementary schools are not peculiar to any one city may be seen

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TABLE 3
PER CENT OF CHILDREN MAKING SLOW, NORMAL, AND RAPID
PROGRESS (Oakland Elementary Schools)

GRADE	PER CENT OF PUPILS		
	Slow Progress	Normal Progress	Rapid Progress
1	26.1	73.3	0.6
2	37.2	49.5	13.3
3	40.4	41.4	18.2
4	41.3	37.0	21.7
5	45.2	34.6	20.2
6	41.7	29.5	28.8
7	37.3	29.9	32.8
8	34.4	28.5	37.1

Table 3 shows the per cent of pupils in each grade of the Oakland elementary schools (1919-1920) who had made normal, slow, or rapid progress. By normal progress is meant the ability of a child to move forward at the rate of one complete grade for each year that he attends school. A child who has made slow progress has had to repeat one or more grades in his school career; a pupil who has made rapid progress has been able to cover more than one term's work in six months. Read the table thus: Of the children enrolled in the first grade, 26.1 per cent had failed one or more times since entering school, 73.3 per cent had made normal progress, 0.6 per cent had been able to make an extra promotion.

from the study of any of the numerous school surveys which are being made from year to year. Table 4 gives an example of conditions prevailing elsewhere similar to those which exist in Oakland. In an Eastern city of 300,000 population, first-grade pupils ranged all the way from five to twelve years of age, while fifteen-year-old children were working in every grade from the second to the eighth, inclusive. School systems throughout the country, in the East and West alike, are encountering the same problems of over-ageness, of slow and rapid progress, of age and grade variation — in short, all the problems that arise from the individual differences of children.

TABLE 4

RANGE OF GRADES (Elementary School) IN WHICH CHILDREN OF A GIVEN AGE ARE WORKING (Eastern city, 300,000 population)

AGE	GRADES IN WHICH FOUND
5	1 to 2
6	1 to 3
7	1 to 3
8	1 to 4
9	1 to 6
10	1 to 7
11	1 to 8
12	1 to 8
13	3 to 8
14	3 to 8
15	2 to 8
16	4 to 8

Table 4 shows the range of grades in which children of each age were found working in the elementary schools of an Eastern city. Read the table thus: Children five years old were found in the first and second grades; children six years old were in the first to third grades, inclusive; etc.

Variation in mental ability. If such wide differences exist in the age and progress of our children as they advance through the elementary school, it is to be expected that there will be found an accompanying variation in the children's mental ability. Table 5 (page 16) reveals such variation in capacity, as measured by the Stanford Revision of the Binet-Simon Tests,¹ in low-first-grade classes of five elementary schools of Oakland. It will be noted that the median mental age² in the five schools of Table 5 varies from $5\frac{2}{3}$ years to 7 years, while the median intelligence quotient² ranges from 86 to 110. In mental ability the first-grade pupils in School A average more than one year below the

¹ The Stanford Revision of the Binet-Simon Tests is often referred to for convenience as merely the Stanford-Binet Tests, or the Stanford-Binet Scale, or sometimes merely the Binet Scale.

² See page 16 (footnote) for explanation of median, of mental age, and of IQ.

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TABLE 5
VARIATION IN MENTAL ABILITY IN LOW-FIRST GRADE IN FIVE
SCHOOLS

SCHOOL	No. PUPILS	MEDIAN ¹ MENTAL AGE	MEDIAN ¹ IQ	MENTAL AGE ¹ RANGE
A	35	5-8	86	3-10 to 7- 0
B	110	6-2	88	4- 2 to 9- 6
C	23	6-4	99	4- 6 to 7- 4
D	53	6-6	97	5- 4 to 9- 0
E	28	7-0	110	5- 0 to 8-10
	249			

Table 5 shows the variation in mental ability existing in low-first-grade classes in five schools in Oakland. Read the table thus: In School A the low-first grade, consisting of 35 pupils, shows a median mental age of 5 years 8 months, with a median intelligence quotient of 86; the lowest pupil in the class has a mental age of 3 years 10 months; the highest, 7 years 0 months. In School B, 110 low-first-grade pupils have a median mental age of 6 years and 2 months, with a median IQ of 88; etc.

¹ By "mental age" is meant the intellectual level of the child, as measured by the Stanford-Binet Scale. The mental age is determined regardless of what the actual chronological age may be. For example, a child seven years old may show the mental ability of a child of five or six, or he may have, on the other hand, the mental ability of an eight- or nine-year-old pupil.

The "intelligence quotient" is the relation between the chronological age and the mental age as measured by the test. A child who is six years old and, according to test results, displays normal mental ability (i.e., that of a six-year-old) is said to have an intelligence quotient (IQ) of 1, or, as it is usually written, of 100. A six-year-old pupil, however, who has a mental age of eight years has an IQ of $8 \div 6$, or 133. Thus the range in IQ from 86 to 110 represents a variation in brightness from that which would be characterized as "dull" to that designated as "superior."

The "median" of any group of measurements is that which is found by arranging all measurements of the group in order from the highest to the lowest and taking the middle one. The median is one method of expressing the central tendency of a group of measurements, similar to but not identical with the arithmetical average or mean. A simple example may be given as follows: Of the measurements 18, 20, 21, 25, 28, 34, and 36 the median is 25 (i.e., the middle one), while the average is 26 (i.e., the sum of all measures given divided by the number of measures in the group). For complete discussion of the median, its significance, and the method of its computation, see H. O. Rugg, *Statistical Methods Applied to Education* (page 103); also C. Alexander, *School Statistics and Publicity* (page 129).

first-grade pupils in School E, and to make matters worse the pupils in School A are, as is indicated by median IQ, slow to learn, while those in School E are bright and quick to grasp instruction.

Range of ability in a given grade. The difficulty that most concerns the teacher arises out of the amount of difference in ability between the lowest and the highest in her class. Note the column in the table marked "mental age range," Table 5. In School A the teacher faces a difference in mental age between the lowest pupil and the highest pupil in her class of 3 years and 2 months; in the other schools it is respectively 5 years and 4 months, 2 years and 10 months, 3 years and 8 months, and 3 years and 10 months. In the whole group embracing 249 pupils in five schools the range extends from mental age 3 years and 10 months to mental age 9 years and 6 months, a difference of 5 years and 8 months. That is, two children in the first grade may differ in mental age by as much as five or six years. Clearly, then, the fact that these 249 children all entered the first grade at approximately six years of age gives little evidence that they all have equal ability to accomplish low-first-grade work. These five schools are typical of five different sections of the city. A similar table could be formed from five different cities or from five different states of the Union. Other studies of this problem bring out the same facts; namely, that the median ability of pupils in some schools is high and in others low, but that in all, unless segregation has been made, there is an enormous range between the lowest and highest in the class. Such differences in ability have been found in every grade of the elementary school.

Variation in accomplishment. The variations so far noted in age, grade, progress, and ability are naturally accompanied by corresponding variation in accomplishment in a given grade. The results of any standardized educational test in

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TABLE 6¹
VARIATION OF ACCOMPLISHMENT IN ARITHMETIC
(Stone Reasoning Test)

GRADE	NUMBER OF PROBLEMS SOLVED																	TOTAL No. PUPILS	MEDIAN SCORE	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			17
V .	15	32	70	86	71	61	55	40	14	6	2	1	..	..	..	..	..	..	453	3.7
VI .	..	9	13	34	41	70	75	60	76	42	24	16	2	5	1	..	..	..	468	6.4
VII	1	..	2	10	18	36	40	47	45	50	37	35	23	29	16	13	3	5	410	8.6
VIII	..	..	2	3	8	18	14	18	28	27	25	31	16	33	13	24	9	15	284	10.5

Read the table thus: In grade five, 15 children solved no problems correctly, 32 solved 1 problem, 70 solved 2 problems, etc. The total number of pupils in the fifth grade was 453, and the median number of problems solved by all of them was 3.7. Read in the same manner for grades six, seven, and eight.

any school subject and in any grade reveal the large individual differences among pupils in accomplishment. Table 6 shows how the children of the fifth, sixth, seventh, and eighth grades of a Western city varied in the scores which they obtained in a standard arithmetic test. In grade five there were 15 children who could not solve a single problem given in the test, while 23 children solved 8 or more. In grades seven and eight the variation in accomplishment was even greater. Moreover, in the eighth grade there were 91 pupils who accomplished less than the median child of the seventh grade, while 45 of these same eighth-grade children did not reach the median score of the sixth grade. In every grade, from the fifth to the eighth, inclusive, there were some children who solved only two problems and others who solved as many as eleven.

¹ Adapted from Ellwood P. Cubberley et al., *School Organization and Administration*, page 187.

TABLE 7¹

VARIATION OF ACCOMPLISHMENT IN COMPOSITION (Hillegas Scale)

GRADE	RATINGS, AND NUMBER IN EACH GRADE MAKING EACH RATING									TOTAL NO. PUPILS	MEDIAN RATING	
	0	1	2	3	4	5	6	7	8			9
IV .	3	136	159	157	159	51	43	15	—	—	723	2.9
V .	21	100	115	140	133	69	53	21	1	—	653	3.1
VI .	1	38	89	120	123	106	67	31	8	4	587	3.8
VII .	1	17	51	84	165	95	88	70	13	13	597	4.4
VIII .	—	3	20	44	81	87	92	82	29	45	483	5.4

Read the table thus: Of 723 pupils in the fourth grade, 3 made a score of 0, 136 made a score of 1, 159 a score of 2, etc. The median score or rating for the total number of 723 pupils was 2.9. Read in the same manner for grades five, six, seven, and eight.

Table 7 shows a similar condition of variation and overlapping in English composition. Here again the same rating was earned by various pupils in every grade in which the test was given. In grades six and seven the variation is greatest, ranging from the score of 0 for one pupil to the maximum score of 9 for four children in the sixth grade and for thirteen in the seventh grade.

Let us cite from experience in the Oakland schools an example of this variation in accomplishment. Two pupils were in the eighth grade, both taking the same subjects preparatory to graduation from the elementary school. A standard test in arithmetic was given to the class. Pupil X (a boy thirteen years old) made a score on the test that was above the accomplishment to be expected in the high-eighth grade; Pupil Y (a girl fourteen years old) barely reached sixth-grade attainment. The inferiority of Pupil Y was

¹ Adapted from Ellwood P. Cubberley et al., *School Organization and Administration*, page 143.

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marked in all of the four fundamental operations, but it was most conspicuous in addition. Pupil X tried 14 addition problems and got 11 right; Pupil Y in the same period of time tried 5 problems and got none right. Both of these pupils graduated from the eighth grade at the end of the year. Was graduation any index of their ability in arithmetic? Evidently the fact that a pupil is placed in a given grade is little indication of his power of accomplishment in a given subject of the curriculum.

THE HIGH SCHOOL

If such variations as have been discussed are found throughout the grades of the elementary school, it is but natural that one should expect them to continue among high school students, who are only elementary pupils grown a little older. The elimination of the markedly inferior child before he reaches the high school tends to reduce such variation in these grades by a small margin; yet the ranges in age, accomplishment, and capacity are still wide enough to bring the high school teacher face to face with the problem of individual differences. Moreover, with the general increase of the age limits for compulsory school attendance, we must expect the problem to grow not less but greater.

Variation in age. A recent survey of an unselected group of 136 tenth-grade boys in the Berkeley (California) high school showed a range in their ages from 13 years to 18 years 3 months. Table 8 shows the complete distribution. The normal chronological age for the low-tenth grade is considered as extending from 14-9 to 15-9.¹ Only 60 per cent of the boys fell into this group; 23 per cent were older than this; 17 per cent were younger. Students of five different year groups were working in the same high school classes and attempting to meet the same standards of accomplishment.

¹ This allows 3 months' leeway at both the upper and lower limits of what would strictly be the age for low-tenth grade (i.e., 15-0 to 15-6).

TABLE 8
DISTRIBUTION OF AGES OF 136 LOW-TENTH-GRADE BOYS

AGE	NO. STUDENTS
13-1 to 13-6	2
13-7 to 14-0	1
14-1 to 14-6	22
14-7 to 15-0	33
15-1 to 15-6	28
15-7 to 16-0	19
16-1 to 16-6	15
16-7 to 17-0	8
17-1 to 17-6	3
17-7 to 18-0	3
18-1 to 18-6	2
Total	136

Read the table thus: Two of the 136 low-tenth-grade boys were in the age range from 13-1 to 13-6, while one more was in the range from 13-7 to 14-0; etc. Note the wide extent of the distribution.

Variation in intelligence. The lack of homogeneity in age shown in Table 8 is fully explained by the additional information concerning these same boys which is given in Table 9; i.e., the variation of their intelligence quotients as determined by a group mental test.¹ The range of GIQ extends from 74, which represents distinct mental inferiority, to 141, which, according to Terman, marks the beginning of the "near" genius group. Is it surprising that the high school teacher finds such wide variation of accomplishment in her classes as indicated by the term grades earned by her pupils? Such variation differs with different high school subjects and with different teachers, but the general condition existing in every department is the same.

¹ See Chapter III for discussion of group mental test.

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TABLE 9

DISTRIBUTION OF GROUP INTELLIGENCE QUOTIENTS OF 136 LOW-TENTH-GRADE BOYS

GROUP INTELLIGENCE QUOTIENT ¹ (GIQ)	No. PUPILS
Below 75	1
75- 84	8
85- 94	21
95-104	27
105-114	35
115-124	34
125-134	7
135-144	3
Total	136

Read the table thus: One of the 136 low-tenth-grade boys showed a group intelligence quotient of less than 75; 8 were in the range from 75 to 84; etc. Note the wide variation, extending from the definitely inferior range (below 75) to the very superior or "near" genius type (135-144).

Variation in accomplishment. Table 10 shows the term marks given to this class of low-tenth-grade students, including in this case the girls as well as the boys. Of a total number of 1048 grades earned in various subjects by the 262 students, 81 were marked "1" (excellent), 439 were "2" (satisfactory), 348 were "3" (passed), and 180 were marked conditioned, failed, or incomplete. Every high school teacher is familiar with this situation as it arises in her own classes or in her own school. High school students *do* vary in mental ability, hence they *must* vary in accomplishment.

¹The "group intelligence quotient" (GIQ) is the intelligence quotient obtained from a group mental test. It is computed on the basis of mental age equivalents for group test scores, as determined by standardized procedure. This GIQ is only approximate, however, and not so dependable as the IQ obtained by an individual test.

TABLE 10
DISTRIBUTION OF MARKS EARNED BY 262 LOW-TENTH-GRADE
PUPILS

SCHOOL MARKS	NUMBER OF MARKS	PER CENT OF MARKS
1 (Excellent)	81	7.8
2 (Satisfactory)	439	41.9
3 (Passed)	348	33.2
4, 5, Inc. (Condition, Failure, or Incomplete) . .	180	17.1
	1048	100.0

Read the table thus: Of the 1048 grades received in various subjects by 262 low-tenth-grade pupils, 81, or 7.8 per cent, were "1" (excellent); 439, or 41.9 per cent, were "2" (satisfactory); etc.

BASIS OF GRADE CLASSIFICATION

Factors producing variation in school progress. The foregoing analysis of conditions as they are found in typical school systems indicates that past methods of classification of children into grades do not bring about a homogeneous grouping as to age or accomplishment. The two principal factors that affect age-grade status are the time spent in school and the ability to learn. In the first instance, a child who is sick, who has moved about, or who for some other cause has been out of school a portion of the time, has missed a part of his work. He fails to keep pace with his fellows and is usually set back a grade. In the second instance a child may attend school regularly but because of inferior mental ability he may fail to accomplish the work set as standard for his grade and thus become retarded.

Lockstep tendencies. Poor attendance and low mentality are constantly operating in our schools to produce failure and consequent over-ageness. For two reasons, however, it is not so easy for a child to make rapid progress. In the first

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place, full-time attendance is usually supposed to be necessary in order to accomplish the required work. However superior the child, he is likely to be required to proceed at a regular pace with his fellows. Secondly, it is not a common characteristic of a child in school to attempt to show how much more he can do than is required by the ordinary assignment. The average teacher with thirty to fifty children in one class hardly has the time to find out who could do more than the work assigned, nor has she had training in the use of the measurement methods which would enable her to locate children of superior ability. Accordingly, in public school practice everywhere one important factor in determining the grade-status of children has been the time spent in school. The child who has spent his year in a grade, unless something is seriously wrong with him or his teacher, is promoted at the end of the year. As a matter of fact, if such promotion does not take place, the ability of the teacher is soon the subject of question and criticism. Teachers in self-defense tend to follow the law of least resistance and give promotions many times when they themselves doubt the wisdom of doing so.

CHANGING EMPHASIS IN TEACHER-TRAINING WORK

Child psychology. During recent years there has developed a strong tendency in teacher-training institutions to emphasize child psychology. Subject matter and methods have from early times been important items in the training of the teacher, but the wide variations apparent in the abilities of different children when they attempt to accomplish the same results by a given method have forced teachers more and more to take into consideration individual differences in their pupils. Attention is shifting from subject matter and method to the nature and needs of the individual child. The importance of school systems is giving way to

the importance of children. The *child* is to be educated, and it is the individual child which thus becomes the center and object of the teacher's work.

The study of individual differences. Teachers must be trained to study individual differences in order that they may more effectively adapt their instruction to the needs of children of all grades of ability. Since ability to learn varies from that possessed by the imbecile to that possessed by the genius, and since the public schools actually have all these variations to deal with, it is obvious that the teacher ought to be trained in the methods of measuring the ability and accomplishment of children. Thorndike has said, "No one, unless he were himself an idiot in the trait of common sense, would train a genius and an idiot alike or expect them to develop alike."

A supervisor who visits from school to school will frequently hear such remarks from teachers as the following: "This is a slow class;" "This is a bright class;" or "I have five children who simply cannot do the work in this grade;" "My class last year was so much better than this." Often these statements are based upon facts, and the problems suggested demand serious consideration. But these are the personal opinions of the teacher, and such opinions need to be checked in the light of impersonal test data.

We have no right to pass judgment on the results which a teacher secures from a given pupil or class until we know the grade of mental ability upon which she works. The classroom teacher is beginning to learn that neither she herself nor any one else can judge her work fairly unless the mental ability of her pupils is known. She is learning that she cannot hope to be very successful in holding the interest of her pupils unless she knows how they differ and unless she is allowed to introduce variations in assignments and in standards of accomplishment.

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If we are really to educate all the children of all the people, we must adjust our instruction to fit the needs of superior and inferior children, as well as the needs of average children. Democracy of opportunity demands no less. One important tool which has been developed to assist us in reorganizing the scheme of gradation and promotion, the curriculum content, and the methods of teaching in our schools is that which is known as the "mental test." In the next chapter we shall discuss the nature of such tests.

SUMMARY

1. Current classification by grades was introduced to bring about homogeneous grouping of pupils. Actual surveys, however, show how inadequate such classification has been.

2. Variation in the age of pupils working in the same grade ranges from one to eight years. This situation is common to school systems in all parts of the country.

3. Similarly wide ranges of variation have been shown to exist in the mental ability of pupils and in their accomplishment of classroom work in every school grade.

4. The chief factors producing variations in age, accomplishment, and progress are time spent in school and innate ability to learn.

5. The wide variation apparent in the abilities of different children has forced teachers to shift emphasis from the study of subject matter and method to the study of the nature and needs of the individual child.

6. If we are to educate all children, it will be necessary to adjust instruction to meet the needs of all grades of ability.

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CHAPTER THREE

WHAT ARE MENTAL TESTS?

GENERAL PRINCIPLES

Old and new attitude toward mental testing. A few years ago if it became known that a mental test had been given to Johnnie at school, immediately there arose the question: "Why, what can be wrong with Johnnie's brain?" Furthermore, the principal of the school might expect an early visit from Johnnie's parents in irate protest over the fact that their child had been humiliated to such an extent that it was thought necessary to test his intelligence. In other words, in the minds of the general public, and of some educators, anything so suggestive in its title as a "mental test" was regarded as a mysterious instrument to be used only with abnormal subjects suspected of needing institutional care.

Very different is the attitude toward mental testing today. In school systems where an extensive testing program has been adopted, the fact that a mental test has been given to a particular child carries with it no stigma whatever; it is only the too free discussion of test results in cases varying from normal that may cause trouble. All school children, from the most brilliant to the slowest, should be studied by means of mental tests. Such tests are now generally recognized as a legitimate and valid method of investigating a child's educability, a method which reveals the nature of the child's mental response and shows his ability to think and reason. If the test is properly given, its results may prove exceedingly helpful in the child's school adjustment and in his general educational guidance.

What mental tests measure. Mental tests have been developed for the purpose of measuring the "general intelli-

gence" of an individual. They do not enable us to analyze in any great detail the individual elements of intelligence, such as memory, attention, imagination, etc. These factors are so intricately interwoven in our ordinary thought processes that it is impossible to separate them from one another. Any one or more of these mental functions may be concerned in making the mental adaptation that any particular test requires, but the test does not attempt to measure them separately. It is rather a means of studying the behavior of the mind functioning as a complete unit.

Although psychological authorities are not unanimous upon the technical interpretation of the term "general intelligence," all agree that it should designate the inborn capacity of an individual to adapt himself to new situations in life, and this, in turn, is very closely related to the ability to learn. Hence Buckingham¹ concludes that however psychologists may differ in the definition of abstract intelligence, "we are justified, from an educational point of view, in regarding it as ability to learn, and as measured by the extent to which learning has taken place or may take place." In his *Development of Intelligence in Children*, Binet says: "It seems to us that there is a fundamental faculty, the alteration or the lack of which is of the utmost importance for practical life. This faculty is judgment, otherwise called good sense, practical sense, initiative, the faculty of adapting one's self to circumstances. To judge well, to comprehend well, to reason well, these are the essential activities of intelligence."² In commenting upon this and upon other definitions of intelligence which have been offered by psychologists, Terman says that "they differ mainly in point of view or in the location of the emphasis. Each expresses

¹ "Intelligence and Its Measurement." *Journal of Educational Psychology*, May, 1921.

² Binet and Simon, *Development of Intelligence in Children* (translated by Elizabeth Kite), page 42.

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a part of the truth, and none all of it. It will be evident that the conception of Binet is broad enough to include the most important elements in each of the others.”¹

If, then, we may regard general intelligence as the “ability to learn,” or the power to “judge well, to comprehend well, to reason well,” we may conclude that the intelligence test ought to measure a child’s ability to accomplish the tasks of the school. It is because they do enable us to diagnose the mental conditions which make for probable school success or failure that intelligence tests are so valuable to teachers and school administrators. Just how they can be used to obtain the most satisfactory results will be discussed in later chapters.

Limitations of mental tests. False impressions have arisen from time to time regarding the claims made for the intelligence tests. The enthusiastic novice in their use often makes claims for their value which cannot be substantiated. Those who are most familiar with the use of the tests are usually very conscious of their limitations, and it is only as such limitations are generally recognized and understood that the greatest value of the tests will be realized. The preceding paragraphs have indicated what the mental test measures; the following statements, on the other hand, will serve to point out what it does not and cannot accomplish.

1. *The mental test does not enable us to stamp the child once for all as ranking exactly thus or so in brightness.* It does not justify us in consigning him to an educational groove from which there is no escape. It gives us broad, general classifications of children according to intelligence, but no claim is made for its infallibility. Whatever test score a child may earn, every one will recognize the necessity of leaving him free to develop to the very limit of his ability, even if that limit should go beyond what the test would lead us to expect.

¹ Lewis M. Terman, *The Measurement of Intelligence*, Chapter III.

2. *The mental test is not a measure of what the child has accomplished in his school work, but of what he is able to accomplish under favorable working conditions.*¹ Such factors as application, health, interest, and environmental influences enter strongly to determine how fully his ability will realize itself in actual achievement. The mental test can only reveal what the child could do with the customary school tasks if he worked to the limit of his ability.

3. *The mental test is not a test of special talents or abilities.* It does not pretend to identify the genius in music, art, or other special line of work. As we have said, it is a test of *general intelligence*, and general intelligence is not synonymous with memory, imagination, talent, or genius of any kind. It is rather that which is common to all thinking, reasoning, and judging and is therefore demanded for success in the common school branches. Beyond giving a measure of such general mental ability and relative brightness the mental test does not go.

4. *The mental test is not the means to discover the vocation for which a child is best suited.* This is a natural corollary of what is stated in the preceding paragraph; for if the test does not reveal special talents or abilities, it cannot tell us the vocation for which those abilities fit the child. It is probably safe to say that the pupil who shows marked general inferiority in mental-test results, as well as in school accomplishment, will never be a success in the professional world; but whether he should follow the career of a merchant, a barber, or a sailor depends upon many factors other than intelligence. Moreover, there is no one as yet who can tell us exactly how much or what intelligence is required for success in various occupations. Who can say what in-

¹ For the measurement of actual accomplishment in school work, so-called "educational tests" have been devised and are used extensively throughout the country. For publications dealing with these tests, see references at end of Chapter VII.

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telligence is needed by the wholesale merchant, by the automobile salesman, by the garage manager, or by the sea captain? On the other hand, it may be equally safe to predict general professional success for the superior student, provided he possesses other necessary qualities of character and of interest; but whether success may best be won in medicine or law or engineering is a matter which the intelligence test does not claim to reveal. Such factors as industry, inclination, and inherent special aptitudes are tremendously important in determining the degree of success that may be attained in any occupation, and these the intelligence test does not pretend to measure.

5. *The mental test is not the sole criterion to be used in the classification of children in school.* The result of the test may point in one direction; the teacher's judgment may indicate another course of action; the child's physical and social history is also an important factor in determining the proper adjustment. All of these must be given due consideration in answering the question, "What will be best for this individual child?" Only when that question is answered carefully, conscientiously, and sympathetically, in view of the need of the child and of the possibilities for adjustment that are at hand, can a mental testing program be said to function properly in a school system. As a matter of fact, a slavish dependence upon the mental test and ignorance in its application may even do great harm.

Some misconceptions. Intelligence tests are often looked upon by those unfamiliar with their make-up as instruments closely akin to the supernatural. Nothing could be farther from the truth. A careful examination of the ordinary test will convince one that it is based upon common sense as well as upon fundamental psychological principles.

A second misconception must be guarded against. The apparent simplicity of the intelligence test has led some to

think that, with little or no preliminary instruction, one needs only to take up the test blank and proceed to give the test. Such might, indeed, be possible provided the person concerned possessed sufficient training in general scientific procedure to follow with the utmost accuracy the directions for giving and scoring even those directions which may seem unimportant and for which the reason is not apparent. However, the person who is inexperienced in giving mental tests is prone to feel that "this procedure could be improved just a little," or that "it could make no difference if this formula were changed." He acts accordingly, forgetting that intelligence tests have been constructed upon definite psychological principles and that the procedure in giving and scoring must be absolutely uniform if results are to be comparable. Hence preliminary training is most important to give to the prospective mental examiner some acquaintance with the basic principles of the tests and the methods of administering them.

Individual and group tests. There are two types of mental tests available for the measurement of general intelligence: individual tests and group tests. What has been said so far regarding the nature of the mental test applies to both of these; there are, however, certain differences which should be noted.

An "individual test" can be given to but one individual at a time. It requires that the full attention of the "examiner," or the person who is giving the test, be given to the single "subject," or individual who is taking the test. To give the Stanford Revision of the Binet-Simon Tests, for example, requires from a half-hour to an hour for each child tested. To give any large number of children an individual examination requires a considerable amount of time, often more than the average teacher feels able to give. It was due to this fact that group intelligence tests were devised. Using a group test a teacher may examine a whole class in less than an hour's time. A few hours additional spent in

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scoring the papers suffices to give a mental rating to all the children in the class.

Greater reliability of individual tests. The question may be asked, "Why use the individual test at all, if the group examination is so much more economical of time and effort?" This is answered by the fact that the result of an individual test has been found to be more reliable than that of a group test. It is self-evident that external factors such as indisposition, nervousness, or momentary distraction cannot be as easily controlled when dealing impersonally with a group of fifty subjects as is possible in testing a subject individually, and in so far as any one pupil in the group of fifty is affected by any one of these factors, just so far is the group test unreliable for that particular child. Furthermore, in the group test the element of time limits for completing the work assigned occupies a far more conspicuous place than in the individual test, with the result that the mind which works slowly but surely toward a given end suffers a disadvantage in comparison with the quick thinker who may be no more accurate than his slower companion. A group mental test is essentially what its name implies; i.e., an instrument for measuring the ability of a number of subjects in a group. Due caution is necessary in the interpretation of the results gained by any single individual within the group. Hence it is desirable, whenever possible, to use the individual test, particularly in problem cases or where the result of the group examination is at variance with the teacher's judgment or with the child's actual school accomplishment. A careful checking of the two types of tests, one against the other, will produce the most satisfactory results.¹

¹ In this connection it is to be understood that the terms "individual test" and "group test" refer to two quite different types of tests. It is, of course, possible to use a group test (i.e., one designed for testing a large number of persons at one time) for a single individual. Such, however, is not the meaning of "individual test" as regularly used; the term is confined to those tests which are designed for testing one person at a time and which

THE INDIVIDUAL MENTAL TEST

Origin of individual testing. There are several scales available for individual testing. Those that are most commonly used in the schools of this country are all based more or less upon the tests devised by Alfred Binet in France and first published in 1905. These are called the Binet-Simon Tests. Simon was a French physician who assisted Binet in the development of the tests. Since the Binet-Simon Tests are largely the work of Binet, they are commonly called the Binet Tests or the Binet Scale. A French commission appointed to study measures "for insuring the benefits of public instruction to defective children" decided that the selection of children for special classes should be made only on the basis of an examination that would reveal their degrees of brightness. The Binet-Simon Tests were devised to meet this situation. Translations have been made into all the leading languages, and it is literally true that the tests are being used in every part of the civilized world.

The Binet-Simon Tests. The Binet-Simon Tests, in the last revision made by Binet himself in 1911, consist of 54 problems, or mental "stunts," which range in difficulty from those lying within the power of three-year-old children to exercises requiring the intelligence of the average adult. These tests are divided into age groups, each of which has been standardized to represent the degree of mental ability which is possessed by a normal child of given age. For example, the group of tests for year 8 includes those mental problems in which a majority of normal eight-year-old children should be able to succeed; the group for year 9 includes those which a majority of nine-year-old children should be able to pass, etc. The total number of tests passed determines the measure of the child's mental ability which is ex-

pressed as "mental age" in terms of the age of the *normal* child who is able to pass the same number of tests.

Revisions of the Binet Scale. Binet's untimely death in 1912 prevented him from refining his method beyond the rough revision which he published in 1911. However, the fundamentals of his work have been made the basis of a number of revisions and extensions in this and other countries. The most important American revisions are those prepared by Terman, Goddard, Yerkes and Bridges, Kuhlmann, and Herring. The form which has come into most general use throughout the English-speaking world is that of Terman, known as the Stanford Revision of the Binet-Simon Tests. In this the fifty-four tests of the original Binet scale have been increased to ninety, the procedure for giving and scoring has been minutely standardized, and the limits of the scale have been extended so that it measures all ranges of mental ability from that of the average three-year-old child to that of superior adults. The tests are arranged by age groups, each group representing the normal ability of the age indicated. The sum total of a child's successes in the tests of these various years determines his mental age, and the ratio of his mental age to his actual or chronological age gives a measure of his brightness, designated as the "intelligence quotient" (IQ).

Mental age. The understanding of the term "mental age" is fundamental in the use of test results. Terman defines mental age as "that degree of general ability which is possessed by the average child of corresponding chronological age." It is "an index of absolute mental level" and "indicates the level of development which a child has reached at a given time."¹ We can best make clear its meaning by defining a specific mental age. Thus, to say that a child has a mental age of ten years means that he has the degree of

¹ Lewis M. Terman, *The Intelligence of School Children*, Chapter I.

mental development — i.e., the mental ability — of the normal child of exactly ten years.

The method of determining the mental age of a child may vary with the test used. The following illustrates the method used with the Stanford Binet Tests: Let us suppose we are testing an eight-year-old child who we believe is about average in general intelligence. The subject would first be given all the tests found in year 8. Following this, if he had failed to pass one or more of the tests in year 8, he would be given the tests of year 7, year 6, etc., until a year was reached in which all tests were passed. This is known as the “basal year.” Suppose the child being examined went down to year 6 before he passed all the tests of any particular year. His basal year would be year 6. He would be credited with passing everything below year 6, on the assumption that since he had passed all the tests of year 6 he would pass the easier tests of year 5, year 4, and year 3 if they were given. It would, therefore, be a waste of time to give the easier tests of these earlier years.

In the same way, if the child had succeeded in passing one or more tests in year 8, the tests of year 9, 10, and following would be given until a year was reached in which the child failed to pass any of the tests. When the examination has thus been carried down far enough so that the year has been found in which the child passes all tests and has been carried up far enough so that the year has been found in which he fails all tests, the examination is complete.

How mental age is computed. On the basis of the method outlined above, the subject is given credit in years for everything up to and including the basal year. Our eight-year-old child who went down to year 6 before he passed all the tests of a year would be entitled to six years' credit at once. In addition, he would be credited with two months for each test passed in the years above 6. There being six tests in

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each year, each has a value of two months.¹ Suppose the child passed four of the six tests in year 7, three of the six in year 8, two of the six in year 9, and none in year 10. He would have earned eight months in year 7, six months in year 8, four months in year 9, and no months in year 10. His mental age would then be indicated as follows:

YEARS	MONTHS	HOW CREDIT IS OBTAINED
5		Given credit for years below 6
	12	Passed all tests of year 6
	8	" four " " " 7
	6	" three " " " 8
	4	" two " " " 9
	0	" no " " " 10
7	6	Total Credit or <i>Mental Age</i>

Our eight-year-old child would thus have earned a mental age, or M.A., of 7 years and 6 months. A child of exactly eight years in chronological or actual age normally has a mental age of 8 years and 0 months.

The intelligence quotient. When the chronological age, or age in years, of a child is known and his mental age has been determined by the test according to the method given above, we have the data necessary for the computation of the intelligence quotient, or IQ. The intelligence quotient is a simple method of expressing the relationship between the child's mental age, or M.A., and his chronological age, or C.A. It should be kept clearly in mind that the mental age indicates the mental level which the subject has attained at the time of the test, while the IQ is a brightness index. Mental age signifies present power, while the IQ signifies future possibilities with reference to mental accomplishment.

¹ In the year groups 12 and above the tests have each more than two months' value, but this fact does not alter our illustration.

How the IQ is computed. The procedure for computing the IQ is as follows: The total number of months in the child's mental age is divided by the total number of months in his chronological age. The result is the intelligence quotient. The following is the formula used:

$$\frac{\text{M.A. (in months)}}{\text{C.A. (in months)}} = \text{IQ}^1$$

For a child with a C.A. of 8 years and 0 months who earned a M.A. of 7 years and 6 months on the test, the computation of the IQ would be as follows:

$$\frac{90 \text{ (M.A. in months)}}{96 \text{ (C.A. in months)}} = .94 \text{ (IQ)}$$

The intelligence quotient is expressed as 94, the common practice being to omit the decimal point and to consider the IQ as a percentage. Expressed in other terms, this means that the child's mental age is 94 per cent of his chronological age. The intelligence quotient is a better means of expressing mental retardation or acceleration than to say that the child is six months retarded or accelerated mentally, since a retardation or acceleration of six months varies in significance at different chronological ages. A half-year of retardation at the age of three means that the child has but 83.3 per cent of the intelligence of a normal child of the same age,

¹ Terman's earlier studies were based upon the principle that mental ability reached its maturity at about 16 years; therefore the age 16 years is taken as the basis for computing the IQ of all who are chronologically beyond 16; in other words, for purposes of finding the IQ no one is more than 16 years old, whether he be actually 16 or 56. Later experience, however, with tests given in the army has resulted in a tentative shifting of the age of mental maturity one or two years lower. The general theory is that there is a steady development of intelligence from birth to a limit not as yet accurately determined, but which appears to be in the neighborhood of 14 or 15 years. Some are even inclined to place the level of "adult intelligence" as low as 13. See Lewis M. Terman, *The Intelligence of School Children*, page 8; also H. H. Goddard, *Human Efficiency and Levels of Intelligence*, page 95.

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whereas a half-year of retardation at twelve years means that he has 96 per cent, or practically all that a normal child possesses. The same principle holds true for a half-year of acceleration.

Interpretation of intelligence quotients. The interpretation of various intelligence quotients as given by Terman¹ is as follows:

IQ	INTERPRETATION
Above 140	"Near" genius
120 to 140	Very superior
110 to 120	Superior
90 to 110	Normal
80 to 90	Dull
70 to 80	Borderline deficiency
Below 70	Mental deficiency (often feeble-minded)

Is the IQ constant? One of the first questions asked by teachers about the intelligence quotient concerns its degree of permanence. Does a child's intelligence tend to fluctuate so that the test shows him to be bright at one age and dull at another, or is his intelligence quotient fairly constant? The final answer to this question cannot be given as yet, since tests have not been in use long enough to have made possible a complete study of any child's mental development. Available evidence tends to show, however, that the IQ is comparatively constant, varying at different examinations not over five to eight points in the majority of cases. In Chapter V the question of IQ constancy is discussed in greater detail and considerable data bearing upon the question are presented.

Some characteristics of the individual test. Certain definite principles are involved in the construction of an intelligence test. Of these the three most important for our consideration are the following:

¹ Lewis M. Terman, *The Measurement of Intelligence*, page 78.

1. *Not a test of schooling.* Every intelligence test has a psychological rather than an educational background. By this is meant that the test is of such nature that ability to pass it depends upon the development of the mind rather than upon opportunities for learning provided in the schools or other environment. Education does not make IQ; it uses it. The six-year-old girl who was recently tested in Oakland and revealed an IQ of 192 cannot be said to have acquired in school the ability to interpret the meaning of fables used for the twelve-year-old level, or to repeat backward the seven digits which are designed for superior adults. She was able to perform these tasks, so impossible for the ordinary child of her age, because of her extraordinary native mental ability. The intelligence test measures ability to adapt to new situations; that is, the ability to learn. It is not intended to test knowledge except in so far as the possession of knowledge is itself an indication of ability to learn.

2. *Based on data from unselected children.* The selection and arrangement of the tests in an intelligence scale have been determined by the careful analysis of results obtained from giving the tests to a large number of unselected children. For example, the tests that are retained in the seven-year group represent those which are passed by the majority of all seven-year-old children, but would be passed by comparatively few six-year-old children, and by nearly all eight-year-old children.¹

3. *Procedure and scoring standardized.* Every test of an intelligence scale is based upon a definite standardized procedure for giving, which must be followed exactly. There must be no variance either in the general approach to the question asked or in the terminology used in asking it. The importance of following prescribed directions cannot be over-

¹ For complete description of method of standardization, see Lewis M. Terman, *The Measurement of Intelligence*, Chapter IV.

emphasized. When the standardized procedure is disregarded, the tests lose their significance because the results are not comparable with those obtained by use of the standard procedure. The method of scoring the responses to the tests has also been standardized, and here again there must be strict conformity to the directions laid down. Violation of this principle will seriously invalidate the test because again the results obtained are not comparable with those secured by standard procedure. Hence it is most necessary for every examiner to familiarize himself thoroughly with the procedure for both giving and scoring as set forth by the originator of the test.

THE GROUP MENTAL TEST

The second type of intelligence test — i.e., the group mental test — still remains to be considered. Since a group examination may be given to all the members of a class or even to two or more classes at the same time, its use may naturally be expected to extend to a very much larger number of people than is practical or possible for the individual test. In many cities the group test is given to all children enrolled in the schools, a practice which we may expect to become general. There are a number of group tests now available for use with children of various grades from the kindergarten up. Certain ones have been devised so that they cover the range of mental ability found in the primary grades, others are designed for the higher elementary grades, others are for high school students, while yet others are used for testing in college and university.

Construction of group tests. It has been stated that the individual test is commonly arranged according to mental age groups, each group representing the degree of accomplishment that might be expected from a normal child of the age specified. Group examinations are not constructed on this basis.

The group intelligence scale is usually made up of from five to ten different types of tests, each one calling for the functioning of one or more mental processes of reasoning, judging, etc. For example, the Army Alpha test, which was used with about 1,700,000 army recruits during the War, includes eight varieties of intellectual "stunts" or problems. Each test in the battery of eight tests contains from sixteen to forty individual exercises which are arranged according to a graduated scale of difficulty from the easiest to the hardest, so that the subject has the opportunity of showing just how far he can go along the line represented by each type of problem. Each exercise is assigned a given number of points, and the total number of points earned represents the child's score on the test. This score may then be compared with the average score made by children of the same age, and the pupil's ability may thus be determined. That is, if a subject's score is found equal to that of the average eight-year-old child, he is rated as having a mental age of eight years; if his score is equal to that of an average ten-year-old child, he has earned a mental age of ten years, etc.

Essentials of a good group test. As with the individual mental test, so with the group examination, certain fundamental principles are involved which determine the value of the results secured from its use. They may be briefly stated as follows:

1. *Variety of problems.* There must be a large variety of mental problems included in the test. General intelligence is revealed not by one specialized type of mental activity, but by the power to meet varied situations with the necessary mental adjustments involved in each.

2. *Graduated scale of difficulty.* The group mental test must show a graduated scale of difficulty in each type of exercise so that there may be a complete examination of the child's ability in each mental process concerned. For ex-

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ample, the first exercises in each one of the Army Alpha tests are simple enough to be answered by the average eight-year-old child; difficulty of the exercises gradually increases until the last of each series challenges the most superior adult intelligence.

3. *Differentiation of ability.* Every successful group mental test must provide sufficient opportunity for differentiation between lower and higher mentality, so that the different grades of subjects, from the very superior through the average group to the very inferior, will each be separated from the others rather definitely in the final scores obtained. Such standardization can be made only through the analysis of results obtained by the examination of thousands of cases.

4. *Objectivity of giving and scoring.* The procedure for giving and scoring the test must be mechanical, permitting no element of personality to enter. Each question is marked either right or wrong; no personal judgment or discrimination is allowed. Therefore there should be little requirement for writing in answering the questions; a check mark or the underscoring of a word is used whenever possible.

5. *Freedom from coaching.* If the same group mental test is given in the same schools during successive years, there must be some provision made whereby it is freed from the element of coaching. For this reason many of the group tests have various so-called "forms," standardized on the basis of equal difficulty, all of which contain exactly the same type of question in each exercise, but of different content. The Army Alpha test, for example, was published in five different "forms," in reality five different scales. Any one of these forms will give results comparable to those obtained from any other.

6. *Timing.* The group examination is so arranged that it can be given within reasonable limits of time. Most of those now in use can be administered in from thirty to fifty

minutes. This ordinarily makes it possible to give the test to a class during a regular instruction period. The limited time allowances also tend to reduce the opportunity for one pupil to copy from another during the test. All are kept busy during the entire period, and discipline is made easy.

Literally millions of children have been examined during the last few years by means of group mental tests. These examinations yield ratings that are reasonably accurate for groups of children considered as groups, but, as we have already stated, they are not as reliable as the individual test in measuring the mental ability of an individual child. Both types of tests have their place in school administration. Later chapters will treat in greater detail the value and use of each.

SUMMARY

1. Mental tests have been designed to measure general intelligence, native ability, original endowment, or capacity to learn. These terms are used synonymously to designate the child's power of accomplishment in school work.

2. It is not the purpose of a mental test to show what a child has learned, nor to reveal specific aptitudes for a given subject or a given vocation.

3. There are two types of mental tests. The "individual" test is used to measure the ability of one person at a time; a "group" test can be given to an entire class at one sitting.

4. Numerous disturbing factors may enter into the administration of a group test, rendering results less reliable than those obtained by an individual test.

5. The result of an individual test is expressed in terms of "mental age" (M.A.) and "intelligence quotient" (IQ); while that of a group test takes the form of a score of total number of points earned. This score, however, can be translated into school grade or mental age equivalent.

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6. The apparent simplicity of mental tests should not mislead the teacher as to their value. They are constructed on the basis of fundamental psychological principles involved in the process of reasoning, judging, and thinking.

7. Test results, to be comparable, must be obtained by following standardized procedure of giving and scoring.

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CHAPTER FOUR

MENTAL TESTS AS A BASIS FOR THE CLASSIFICATION OF SCHOOL CHILDREN

WE have noted in Chapter I some of the significant trends in American education. We have discussed the problems of variation in the age, the progress, and the accomplishment of pupils under our present graded system. We have described the mental test as a tool devised to assist in the study of such problems. Let us now consider the effects of that tool in operation. What practical assistance does the mental test give in the analysis of pupil ability or disability? Does the evidence which it offers corroborate other evidence that can be collected? How closely does the mental test correlate with other bases of school classification which, through long experience, have been accepted as having at least some dependable value?

THE PROBLEM OF CLASSIFICATION

Purpose of classification. The children in our schools are classified by grades for the purpose of placing them into effective working groups. The six-year-old who is just beginning his school experience is placed in the first grade. In current practice he is promoted when he has acquired the knowledge, habits, and skills that are the aim of first-grade instruction, and when he is likely, therefore, to accomplish what may be demanded of him in the next grade. If a child is working less effectively in one grade than he might if placed in another, then he is poorly classified. By the term "working effectively" is meant the satisfactory accomplishment of the requirements of a given grade with reasonable application and with reasonable expenditure of time and effort. When the children of a classroom are all working up to their full capacity and are all accomplishing satisfactory results, then and then only can it be said that the classifica-

tion is one hundred per cent effective. It is true that this condition is seldom attained in any classroom, but we should none the less keep the ideal clearly in view as the goal of our efforts toward the proper gradation of school children.

Criteria used for classification. Various criteria have served as the basis of school classification, all of which are of some, though not of equal, merit. The most important of these criteria have been time spent in school, school accomplishment, and chronological age. Yet the weakness of each one of these is evident from the facts already presented. It has been shown that eleven-year-old pupils are found in all grades from the first to the eighth, inclusive, and that there are correspondingly wide ranges of grade location for children of other ages; also, that in accomplishment marked overlapping occurs in the various grades. Additional modifying factors in the gradation of children are: physical development, health, industry, ability to concentrate, interest, temperament, and environmental influences. No one of these, however, can be considered basic in creating the effective working group that is the object of all gradation.

MENTAL AGE AS A BASIS FOR CLASSIFICATION

There is another basis for classification which is rapidly gaining ground in its influence upon educational organization; i.e., the mental age of the child. The significance of "mental age" and the manner of its computation from the test have been explained in Chapter III. Evidence has rapidly accumulated during the past few years showing that mental age is the best single criterion (though never the only one¹) to be used as a basis for grade classification. No other single factor is so important in predicting the success with which a given child will perform the work of a given grade. In this chapter we shall present data showing the

¹ See Chapters VI and VII for further discussion of this point.

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relationship between mental test results and other bases of classification in common use.

Correlation between mental age and quality of school work. Table 11 gives data for a group of 149 first-grade children, all of whom were tested by the Stanford Revision of the Binet Scale. Previous to the test, they were rated by their teachers as to the quality of their school work according to the following scale:

A means very superior school work.

B means superior school work.

C means average school work.

D means inferior school work.

E means very inferior school work.

TABLE 11
CORRELATION BETWEEN MENTAL AGE AND QUALITY OF SCHOOL WORK
(149 first-grade children)

MENTAL AGE	QUALITY OF SCHOOL WORK					
	E	D	C	B	A	TOTAL
9-6 — up					3	3
9-0 to 9-5					—	—
8-6 to 8-11				1	1	2
8-0 to 8-5		1		1	2	4
7-6 to 7-11			5	1		6
7-0 to 7-5		6	10	7	3	26
6-6 to 6-11		9	18	3		30
6-0 to 6-5		6	14	1		21
5-6 to 5-11	3	7	7			17
5-0 to 5-5	4	6	4			14
4-6 to 4-11	8	7	2			17
— to 4-5	7	2				9
Total	22	44	60	14	9	149

Correlation +.725 (Pearson)

Read the table thus: Three children working in the first grade tested above 9 years mentally; all of them were rated A (very superior) in school work. Two children tested between 8-6 and 8-11; one was rated A (very superior), the other B (superior); etc.

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The figures of the table show that there is a very definite relationship between the mental age of a first-grade child and the quality of his school work as judged by his teacher. For example, three children tested above 9 years mentally; all of them were rated A, or very superior, in school work. Two more showed a mental age between 8 years 6 months and 9 years; one was rated very superior, the other superior. At the lower end of the group were 26 children who tested below five years; all but two were rated by their teachers as either inferior or very inferior. For the whole group of 149 first-grade children the correlation between mental age and quality of school work was $+ .725$ (Pearson formula).¹ Of the 57 children who tested below six years mentally, 44 were doing inferior work, whereas 70 of the 92 children who tested six years or above were rated as average or better. In short, these figures indicate that children who are below six years in mentality find it very difficult to do work that is satisfactory in the first grade, and are more likely to do inferior or very inferior work, while most children who test above six show accomplishment that is of average or superior quality.

¹ For those unfamiliar with correlation in its technical aspects, the following will give a working idea of its meaning: the Pearson formula is a method of expressing the degree of correspondence between two variables, which in this case are (1) quality of school work in first grade, and (2) mental age. A correlation figure may vary all the way from -1.0 to $+1.0$. A correlation of -1.0 means that there is a perfect disagreement, or negative correlation, between two variables; i.e., that one increases regularly as the other decreases. A correlation of $+1.0$ means that there is a perfect agreement, or positive correlation, between two variables; i.e., that one increases or decreases regularly in the same proportion as the other. A correlation of 0.0 means that there is no quantitative relationship between the two variables. Any correlation figure above $.60$ is generally accepted as high, although this is somewhat determined by the nature of the two variables being studied. Therefore the correlation of $+ .725$, found between quality of school work and mental age, indicates that there is a high degree of correspondence between these two factors. For detailed discussion of the method of computing correlation, see H. O. Rugg, *Statistical Methods Applied to Education*, Chapter IX; also C. Alexander, *School Statistics and Publicity*, Chapter VII.

Children mentally below six doing average school work. Table 11 shows that 13 of the 57 children who tested below six years were doing work rated as average. Why is it that some children who reveal a mental age below six are able to do average work in the first grade? There are several possible explanations. In the first place, they may be chronologically over-age and may be repeating the work of the grade; consequently they do average work because they have been over the ground previously one or more times. This was the case with 8 of the 13 children in question. In the second place, in certain first-grade rooms children mentally below six years are able to do "average" work, as judged by the teacher, because the general level of ability in the room is low. In four of the remaining five cases this appears to be the explanation, since they were found in a room of 40 children, of whom 23 tested below 80 IQ and only 5 tested above 89, while the median mental age in the whole class was 5 years 7 months. In such a class a child of inferior mentality could do work that would be rated as "average." "Average" work to a teacher does not represent a fixed quality, but is usually that type of work done by the majority of the children whom she has taught or is teaching. Hence, in a class of inferior pupils, a child may seem to be "average" in comparison with the rest of his group, and yet test low in intelligence. The one remaining case of the 13 who were mentally below six years and yet doing average school work was a child who tested 5 years 8 months, with an IQ of 93; he was therefore nearly normal for the grade.

"Average" work as judged by a teacher. The fact that a teacher is likely to judge the members of her class in comparison with one another rather than according to an absolute standard is shown by the data given in Table 12 regarding two first-grade rooms in which the individual mental

TABLE 12
PUPIL RATINGS GIVEN BY TWO FIRST-GRADE TEACHERS

	No PUPILS	MEDIAN IQ	MEDIAN M A	RATING IN SCHOOL WORK				
				No. PUPILS				
				A	B	C	D	E
Room A	30	85	6-0	1	4	14	10	1
Room B	28	108	7-2	2	4	13	6	3

Read the table thus: In Room A, numbering 30 pupils, in which the median IQ was 85 and the median mental age was 6 years and 0 months, one child was rated A, or very superior, in school work, 4 were rated B, or superior, in school work; etc.

test was given to all children enrolled, and the teacher's rating in school work obtained for each child. Note that exactly the same number of children are marked average or above in each of the two rooms notwithstanding the facts that the median IQ for Room A is 85 and the median mental age is 6-0, while the median IQ for Room B is 108 and the median mental age 7-2. A difference of over a year exists in the average mental ability of the two classes, yet practically the same proportion of children in each room are rated average, below average, and above average in school work.

Children mentally six years or above doing inferior school work. Table 11 shows that 22 of the 92 children who tested six years or above mentally were rated D, or inferior, in school work. Why is it that some children with a mental age of six years or more do not do satisfactory work in the first grade? Again, such apparent disagreement may be due to one of several causes. The fact that a child has a mental age of six or above does not insure that he will do satisfactory first-grade work. Reasonable effort is always a necessary adjunct to capacity. Let us emphasize that a mental test shows not what has been accomplished, but what

in all probability can be accomplished under favorable working conditions. A certain proportion of almost every group of children fail because they have not put forth sufficient effort. Moreover, a child may be six years mentally and may show satisfactory industry and interest, and yet the general level of the class in which he is working may be so much above the average that, in comparison with the rest of the group, he is rated as only "inferior."

There is still a third reason for disagreement in these cases. Over-ageness combined with low mental level complicates matters. Let us suppose that two low-first-grade children have the same mental age of approximately six years. If one is a normal child with an IQ of 100 or thereabouts, while the other is a dull, over-age child of eight or nine years, with an IQ of 70 or 75, the probability is that the younger normal child will do better work than the older mentally retarded pupil, even though the two are of the same mental age. It seems that the alertness of the normal mind more than balances the years of additional experience of the duller child. Whatever the cause, studies made relative to this point lead to the conclusion that, while mental age does indicate similar possibilities of accomplishment, yet the child with a normal IQ is likely to have some advantage over the child of the same mental age but with a low IQ.

The important fact indicated by Table 11 is that for all but a small per cent of these first-grade children the mental test alone was an excellent criterion for classification. Children who test below six mentally are likely to do poor work in the first grade, those who test above six are likely to do satisfactory work. At the time a child enters school, there is no other index of his ability that has shown itself so deserving of careful consideration as the Binet mental test. When used along with other criteria, such as age, industry, accomplishment, health, etc., it makes the creation of effective

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working groups a much easier and surer task than is possible without it. It is a means of checking and refining the teacher's judgment, which otherwise must depend upon external evidence that frequently leaves unfathomed the child's real ability.

Classification to begin when child enters school. It has been shown in Chapter II how wide a range of mental ability exists among our first-grade pupils. Because of the large per cent of pupils who have not reached a mental age of six years before entering school, there is found a correspondingly large proportion of failure in the first grade. Bonner¹ in 1921 reported that approximately one-third of first-grade children in the United States were repeaters.² Such a condition cries out for a scheme of classification that will eliminate just as much as possible of such repetition.

Since the need for better classification in the first grade is so serious, and since the mental test has proved so helpful in classification according to ability, we must conclude that the place to begin testing for classification is at school entrance, before the slow have an opportunity to become discouraged and before the superior have an opportunity to become indolent. By the use of Binet tests classification into ability groups can be made as soon as the child enters school. Such grouping seems to be as accurate on the whole as that which can be made by the teacher after a term's experience with pupils in the classroom. There is no need to wait until the child has spent six months in school before adjusting his grade location. It must be kept in mind, however, that the placement of every child should be checked by

¹ H. R. Bonner, "Compulsory Attendance Laws." *School Life*, January, 1921.

² In Oakland the figure for the year 1917 was 30.6 per cent. The per cent has gradually decreased since that time, until, in 1922, under the reorganization and segregation in first-grade instruction, 18.1 per cent of the children in the grade were repeaters.

continuous observation of all other factors revealed as his work in the class progresses. If any discrepancy develops between test results and actual accomplishment, the causes should be investigated and the best possible adjustment made. Classification begun in the first grade and continued as the class moves on will mean a step forward toward the solution of the problem of securing for each individual the kind of training which will best fit him for his life's work.

GROUP MENTAL TESTS AN AID TO CLASSIFICATION

We have stated that the individual mental test can be administered to only one pupil at a time and that it requires ordinarily from thirty minutes to an hour for each pupil, while the group test makes possible the examination of an entire class at once. Group mental tests have accordingly come into current use as a means of classifying children when there is not sufficient time to give each pupil an individual test. This has been particularly true in the upper elementary grades, where the group test is more satisfactory than with younger children. For various reasons, however, the group test is more subject to error than the individual test, and caution should be exercised by checking up the test results with the teacher's estimate of the child's school work, capacity, and application. The child's classification should come only as the result of the composite rating thus obtained. The group test has proved itself a valuable measure of mental ability except in individual cases where external factors have vitiated test results. Close relationships exist: (1) between test result and quality of school work; (2) between test result and teacher's estimate of intelligence; and (3) between test result and the age of the child. These relationships are treated in the following pages.

TABLE 13
RELATION BETWEEN ARMY ALPHA TEST SCORE AND QUALITY OF
SCHOOL WORK (High-eighth-grade pupils)

RATING IN SCHOOL WORK	MEDIAN TEST SCORE	NO. OF PUPILS
A (Very Superior)	115	16
B (Superior)	96	121
C+ (Above Average)	85	261
C (Average)	75	348
C- (Below Average)	69	240
D (Inferior)	60	92
E (Very Inferior)	52	19
All Children	76	1097

Read the table thus: The 16 pupils who were rated by their teachers as very superior in school work made a median score of 115 on the Army Alpha test; the 121 children who were rated superior made a median score of 96; etc.

Relation between Army Alpha¹ test score and quality of school work. The Army Alpha test was given to 1097 pupils, embracing all the high-eighth-grade classes in the city during a given term. Before the test each pupil was rated by his teachers on a seven-point scale² as to quality of school work. Results proved the direct relationship which exists between test scores and the kind of work children do in school. Table 13 gives the median scores for the children doing the various types of school work as rated by the teachers.

It will be noted that the median scores on the test decrease

¹The group test of mental ability, called Alpha, used by the War Department for testing literate soldiers. The test is now customarily called "Army Alpha."

²A = Very Superior C - = Slightly below Average
B = Superior D = Inferior
C + = Slightly above Average E = Very Inferior
C = Average

The reader will note that two rating scales are used in this text; i.e., (1) the 5-point scale, as used on p. 49; and (2) the 7-point scale, as here used. The latter is preferable because it stimulates the teacher to make more careful discriminations.

TABLE 14
RELATION BETWEEN OTIS TEST SCORE AND QUALITY OF SCHOOL WORK
(High-eighth-grade pupils)

GROUP TEST RATING	NO. OF CHIL- DREN	RATING IN SCHOOL WORK						
		A %	B %	C+ %	C %	C- %	D %	E %
Superior 100 and above (abbreviated Otis test)	228	7.0	25.0	39.0	22.0	6.0	1.0	0.0
Average 70-99 (abbreviated Otis test)	391	1.0	11.0	24.0	43.7	17.0	3.0	0.3
Inferior Below 70 (abbreviated Otis test)	230	0.0	1.0	14.0	32.0	28.0	20.0	5.0
Total	849							

Read the table thus: Of the children who made a superior score¹ (above 100) on the Otis test, 7.0 per cent were rated A (very superior) in school work; 25.0 per cent were rated B (superior) in school work; etc.

Disagreement between test score and school accomplishment. When one asks the reason why even occasional discrepancies occur between test score and school accomplishment, the answer appears in factors such as the following:

1. *Error in test result.* Occasionally a child with good ability, who is doing superior school work, does not do himself justice in the group test because of nervousness, illness, or some other external factor.

2. *Child's failure to demonstrate actual ability by his school work.* Some pupils with good native ability "loaf," and others with only mediocre capacity work very hard. Moreover, some children are repeating the work of the grade and

¹ Of the 849 cases, 27 per cent scored 100 or above; 46 per cent, 70 to 99 inclusive; 27 per cent, below 70.

may be doing better work than their scores would justify, because of their having been over it before.

3. *Teacher's errors in rating.* These are largely due to the lack of a uniform standard by which to judge, and to the tendency to rate any pupil in comparison with the rest of his class rather than upon an objective basis of accomplishment.

Studies such as these point to the fact that, if a child makes a high score in the group test in comparison with the rest of his class, the chances of his doing superior work in that grade are good, and there is but slight danger of his falling below average in accomplishment. On the other hand, if he makes a poor score his school work is likely to be below average or inferior; the possibilities of his doing work that is average or above are very small indeed.

Relation between result of Terman group test and teacher's estimate of intelligence. In general, a teacher has but little opportunity to estimate a child's intelligence except as he demonstrates it in doing his school work. However, a teacher may sometimes recognize superior ability in a pupil who refuses to exert himself sufficiently to do even average work, or she may realize that another pupil with limited mentality is succeeding by tremendous effort in securing only mediocre results. Just what the agreement is between the group test result and the teacher's estimate of a child's intelligence, apart from his actual school work, is shown in Table 15. This table gives the data for 1173 high-eighth-grade children who were given the Terman Group Test of Mental Ability and who were also rated by their teachers as to brightness. The seven-point scale was used for rating. On the basis of the test result a group intelligence quotient (GIQ) was computed for each child. All GIQ's in each of the seven groups formed on the basis of teacher ratings were then arranged in order, and the particular GIQ's that

TABLE 15
RELATION BETWEEN TERMAN GROUP TEST RESULT AND TEACHER'S ESTIMATE OF INTELLIGENCE
(1173 High-eighth-grade pupils)

INTEL- LIGENCE RATING	No. Pupils	Range of Middle 50 Per Cent of GIQ's	GIQ Scale									
			70	80	90	100	110	120	130			
A	55	107-126										
B	203	104-119										
C+	297	96-114										
C	325	89-104										
C-	233	84-98										
D and E	60	76-90										
Total . . .	1173	91-111										

Table 15 should be read as follows: Of the children rated A in intelligence by their teachers, the middle 50 per cent earned GIQ's ranging from 107 to 126; this range is indicated by the horizontal line extending between these limits on the GIQ scale. Of the children rated B in intelligence by their teachers, the middle 50 per cent earned GIQ's as shown by the GIQ scale, ranging from 104 to 119; etc.

comprised the middle 50 per cent¹ of each group were noted. For example, the middle half of the group rated A in intelligence (brightness) earned GIQ's ranging from 107 to 126 by the Terman Test; the middle half of those rated B had GIQ's from 104 to 119; while those rated D and E in intelligence showed a middle 50 per cent ranging from 76 to 90.

It is seen in Table 15 that the GIQ's of the middle half of each group consistently decrease as the teachers' ratings decrease. The whole table gives evidence that the Terman Group Test does in general measure intelligence as it is recognized by high-eighth-grade teachers.

Disagreement between test result and teacher's estimate of intelligence. In a small percentage of cases there was a definite disagreement between test result and the teacher's rating of intelligence. A study of these showed that the majority could be explained. The following reasons were the principal causes of disagreement:

1. The teacher failed to consider the age of the child. Almost invariably over-age children of the grade were rated too high and under-age children were rated too low. A fifteen-year-old pupil in the high-eighth grade may seem to the teacher, because of his maturity, to compare favorably in intelligence with the rest of his class, while the accelerated eleven- or twelve-year-old child in the same grade is rarely given credit for his real superiority because the significance of his under-ageness is not understood.

2. Certain classes were exceptional in that they were composed almost wholly of children above average in intelligence, whereas others were made up mainly of pupils below average. Here again a teacher's rating of an individual child showed

¹ To designate the limits between which the middle half or middle 50 per cent of a group falls is a simple method of locating approximately the rank of the group. It eliminates the upper 25 per cent and the lower 25 per cent of the group, and leaves the middle 50 per cent as representing the general average.

itself to be influenced by comparison of his ability with that of his classmates. Thus in a superior class the really average child suffered in comparison with others of his group, while in the inferior class the really average pupil was rated too high.

3. The test results of some children were influenced by chance factors, such as indisposition, nervousness, or lack of effort during the test. In such cases the score did not represent the full extent of the child's ability.

Relation between Army Alpha test score and age within a grade. One of the most important indications of the effectiveness with which a child works in school comes from a comparison of his age with his grade location. Whenever tests have been made of any group of retarded children (i.e., children who are working in a grade below that in which their ages would lead one to expect them to be), it has been found that such children, according to test, are mentally below average. On the other hand, children who are at-age or under-age for their grade generally reveal a degree of brightness, when tested, that is average or above.

Table 16 gives data obtained for 1108 high-eighth-grade pupils who were given the Army Alpha group intelligence test. The median scores made on this test are indicated for the various age groups found in the grade. Notice that they decrease regularly each year as the age increases. The sixteen- and seventeen-year-old pupils, who were two and three years over-age for the grade, made scores that were lower than those of the children who were twelve and thirteen years old and under-age for the grade. The records showed that many of these sixteen- and seventeen-year-old pupils had been regular attendants at school since they were six years of age. They had required ten or eleven years to do eight years' work. Their test scores indicate the real reason why it took them so long to complete the regular elementary

TABLE 16
RELATION BETWEEN AGE AND ARMY ALPHA SCORE
(High-eighth-grade pupils)

AGE	MEDIAN SCORE	NUMBER OF CHILDREN
12	89	23
13	87	184
14	80	426
15	74	320
16	63	122
17	55	33
All Ages	77	1108

Read the table thus : Of 1108 children in the high-eighth grade, the 23 who were 12 years of age made a median score of 89 in the Army Alpha group test; the 184 pupils who were 13 years old made a median score of 87; etc.

school course. The twelve-year-old children had all been in school six years or less and had done eight years' work. Their test scores likewise point to the real reason why they had been able to make such rapid progress. Hence it appears that the group mental test result bears a close relationship to the rate of progress which a child has made in school.

In view of such findings, there can be no doubt of the value of the mental test as an aid in classifying children into effective working groups. The mental test should be used for this purpose in every school system. Always, however, due consideration should be given to such factors as age, accomplishment, and teachers' judgments. There should always be complete willingness to make readjustment on the basis of any one or all of these factors when the best interests of the child demand it. Further consideration of these additional factors will be given in later chapters.

SUMMARY

1. The most common bases in general school practice for grade location of pupils have been time spent in school, accomplishment in subject matter, and chronological age. The weakness of each one of these has been demonstrated through numerous surveys of school systems.

2. The mental age as determined by an intelligence test is the most important factor in determining grade placement.

3. The individual mental test (Binet) is the most reliable single criterion for proper classification of first-grade children. Children mentally below six years seldom do satisfactory first-grade work, while those with a mental age of six years or above almost always do work that is average or better.

4. In the upper elementary grades the result of a group mental test gives a valuable index of the quality of school work which may be expected of a child.

5. The intelligence of a child as estimated by his teacher correlates highly with the result of the group mental test.

6. In any grade the score made on a group mental test bears an inverse relation to the age of a child, and is accordingly indicative of the rate of progress he has made in school.

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CHAPTER FIVE

WHO WILL SUCCEED IN SCHOOL?

Mental tests as a basis of prediction. We have seen in the preceding chapter that mental tests have a high correlation with the various factors that under present requirements constitute school success (such as school marks, teacher's estimate of intelligence, etc.) *at the time when the test is given*. The next question that arises is: Can we predict later school success?

Every one will admit that there are many factors other than mental ability involved in determining the success or failure of a person in any line of work; but if it be true that mental ability is the most important single factor operative in determining success in the various types of school work, then we should use the knowledge of that fact to prevent the waste of time, effort, and money which always results when we set tasks for children that are beyond the limits of their comprehension.

What then does the mental test show as to probable school success which will later be attained by a child of high or low IQ? We shall approach the problem through two questions: (1) How much may we rely upon test results obtained at some previous time? That is, what is the degree of IQ constancy as shown by a retest of the same child? (2) How well do the test data for children agree with their school records for a period of years succeeding the test?

CONSTANCY OF THE IQ

Importance of IQ constancy. The answer to the first question regarding the constancy of the IQ must be determined before any reliable prediction concerning a child's school progress can be made on the basis of test data. If the IQ fluctuates from 100 today to 120 or to 80 tomorrow

or next year, then we have no basis upon which to judge the rate of progress to be expected from a child. Therefore the study of the results of two tests given at different times to the same child becomes a matter of prime importance. To what extent do the intelligence quotients found by the two different tests agree? Does an IQ of 90 this term remain approximately an IQ of 90 during the terms that follow? If a child tested two years ago revealed an IQ of 125, may we expect to find him possessed of the same superiority today, and may we reasonably expect corresponding results in his school work? If these questions can be answered in the affirmative, then we have a basis upon which to make reliable predictions regarding school progress.

Studies made of IQ constancy. Numerous studies have been made concerning the constancy of the IQ,¹ and all have pointed to the fact that it remains relatively the same from the time of one test to that of the next, whether the interval of time between the two tests be two months, or two years, or longer. In nearly a dozen different investigations the coefficient of correlation² between first and second test results has not been less than .72, while in nearly all cases it has exceeded .80.³ Terman in retesting 435 cases

¹ See references at end of chapter.

² See Chapter IV (page 50) for explanation of correlation.

³ Exact findings are as follows:

Stenquist	.72 (274 cases)
Rugg and Colloton	.84 (137 cases)
Terman	.93 (435 cases)
Baldwin	.72 to .93 (for various groups)
Gordan	.84 (44 cases)
Bobertag	.95
Rosenow	.82
Cuneo and Terman	.85 (31 cases)
	.94 (21 cases)
	.95 (25 cases)
Garrison	.88 (298 cases, 1 year's interval)
	.91 (127 cases, 2 years' interval)
	.83 (42 cases, 3 years' interval)

found the exceedingly high correlation of .93, and in two other studies involving a more limited group of children the correlation reached .94 and .95, respectively. A majority of investigators, working independently, have obtained differences greater than ten points in less than one sixth of the cases involved. The average IQ change usually ranges from 4 to 7. The differences have been found to be only slightly larger with younger children; hence age does not seem to be a significant factor in the degree of change to be expected from one test to the next.

It has also been found that the amount of change in the re-test is approximately the same, irrespective of the intelligence of the pupils. Louise E. Poull, Psychologist of the Children's Hospital, Randall's Island, New York, made a study¹ of 126 mental defectives with reference to the constancy of the IQ as determined by the Stanford-Binet Scale. The interval of time between tests varied from six months to three years, the ages of the individuals tested from four years to twenty-eight years, and the IQ on the first test from 20 to 90. She found the average change from the first to the second test to be an increase of 1.28 points (which is a negligible quantity), with the middle 50 per cent² of all changes extending from a decrease of 3.3 points to an increase of 4.8 points. There is no indication, therefore, that the result of the second test is likely to be much higher or lower than that of the first, or that mental defectives are less constant in IQ than normal subjects.

Oakland data. In further investigation of the constancy of the IQ, the writer has gathered data in the Oakland and Berkeley schools involving 288 pairs of tests (each pair of tests having been given at different times to the same child).

¹ Louise E. Poull, "Constancy of IQ in Mental Defectives." *Journal of Educational Psychology*, September, 1921.

² See Chapter IV, page 61, for explanation of "middle 50 per cent."

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These 288 pairs of tests (or 576 individual tests) were made, not by a few expert psychologists, but by a group of 84 different examiners, including chiefly teachers in the schools who had been or were being trained in mental testing. The ages of the subjects varied at the time of the first test from four years to sixteen years; the IQ range was from 33 to 136 on the first test, and from 33 to 140 on the second, with a median IQ in each complete set of tests of 86. The time intervening between the two tests varied from less than one month to three years, with a median interval of thirteen months.

A study of these 288 pairs of tests revealed the following facts:

1. Coefficient of correlation (Pearson) = .90
2. Median difference in IQ between first and second tests. = 5.1 points
3. Central tendency of change.¹ = +0.5 point
4. Range of middle 50 per cent of changes.¹ = -5.6 points to +4.4 points
5. Distribution according to number of points difference in IQ:

NO. OF POINTS DIFFERENCE	PER CENT OF TESTS
0—10	88.2
11—20	9.7
More than 20	2.1

Only in 34 retests, or 11.8 per cent of the 288 cases, does the difference in IQ between first and second tests exceed ten points. The average tendency of change in the IQ is only one half of a point above zero; i.e., an increase of 0.5 point in the IQ earned in the second test over that earned in

¹ By "central tendency of change" is meant the median difference between first and second test results found from a complete distribution ranging from the highest positive difference (i.e., the greatest increase found in the second test result) to the highest negative difference (i.e., the greatest decrease found in the second test result). This median or central tendency was +0.5 point. The middle 50 per cent of changes, or inter-quartile range, in this distribution extended from 5.6 points below 0 to 4.4 points above 0.

the first. This indicates that there is little probability that the IQ of a child will be either raised or lowered by an appreciable margin through repetition of the test.

Influence of external factors. Analysis was then made of the effect that might be produced in a retest by such factors as the age, intelligence, and interval of time elapsing between tests. Is the IQ more likely to fluctuate with a twelve-year-old child than with a six-year-old? Is there greater probability of change after an interval of several years than after only a few months? Does the IQ vary more or less with bright than with dull children? Every investigation has shown that external factors have little influence in producing fluctuations of the IQ. It has been found by the writer and by other investigators that the change from first to second test is slightly larger with very young children than with older pupils, but this age influence does not appear to be large enough to be very significant. The average difference between the first and second tests is nearly the same, regardless of age, intelligence, or time interval.

Cases differing by more than ten points. A difference of five points in the IQ between first and second tests is generally conceded as a reasonable possibility of error in results, and no change of this amount need cause concern. As the difference approximates or exceeds ten points, however, there is always need to ask the question "Why?" Why, in our results, did 34 out of the total of 288 retests show a discrepancy of more than ten points between the two test results? Table 17 answers this question for all but eight cases.

Seventeen of the children of Table 17 were designated by the examiners as having a distinct language difficulty when the first test was given at the time of entering school. Therefore it was impossible for them to reveal all the mental ability they possessed until they had received definite help in English expression through school experience. Apparently they

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TABLE 17

ANALYSIS OF 34 CASES SHOWING IQ DIFFERENCES OF MORE THAN
TEN POINTS BETWEEN FIRST AND SECOND TESTS

AGE RANGE OF CHILDREN TESTED				
	4 yrs to 6 yrs 11 mos (129 cases)	7 yrs to 9 yrs 11 mos (110 cases)	10 yrs. or more (49 cases)	Totals (288 cases)
Foreign language difficulty	13	4	0	17
1 or both tests not complete	2	2	2	6
Psychopathic cases	3	0	0	3
No apparent cause for disagreement . .	5	1	2	8
Totals	23	7	4	34

Range of time interval = 4 mos. to 33 mos.; median time interval = 13.5 mos.

In 13 of the 34 cases both examiners were certificated. In 21 cases only one of the examiners, or neither, was certificated.

Read the table thus: Of the 34 cases showing differences of more than ten points between first and second test results, 17 appeared to be due to language difficulty; 13 of these involved children who were in the age group from 4 years to 6 years 11 months at the time the first test was given, while the other 4 children were between 7 years and 9 years 11 months. Read in the same way for other items of the table.

failed on certain tests during the first examination because they lacked the ability to understand or to speak the language in which the test was given. Hence the factor of language difficulty should be taken into account, especially in those communities in which children enter school from foreign homes. It was found, however, that in the same age groups (considering the total number of 239 cases ranging from 4 years to 9 years 11 months) there were included 30 other children who also came from homes with a definite foreign influence, but who, by the time the first mental test was given, had had sufficient contact with English-speaking children outside their own homes to eliminate or at least to reduce

greatly the language difficulty. In these cases the two tests made of the same child show a difference of not more than nine points in the IQ, with a median change of five. In a cosmopolitan community the language difficulty does not necessarily destroy the value of a general program of mental testing.

Of the 34 cases showing large discrepancies, 21 involve tests of which one or both were made by examiners in the early stages of their experience previous to certification,¹ and hence cannot be credited with unquestioned accuracy. In some instances psychopathic conditions of the child, and in others failure to make the mental test complete at the upper or lower limit, are additional reasons for wide variations found between first and second test results. In the final analysis only 8 retests out of a total of 288 cases show a disagreement of more than ten points without apparent cause for the discrepancy. Such evidence proves the reliability of the test and justifies confidence in its use.

INDIVIDUAL TEST RESULTS VS. SUBSEQUENT SCHOOL RECORDS

Further assurance regarding the constancy of the IQ comes from following the progress of children who have been tested by the Stanford-Binet Scale at the time of school entrance in the kindergarten or first grade, and from comparing such progress with the test results. If the prediction made on the basis of such a test proves true through succeeding years, then we have a basis for tentative classification of pupils entering school. Let us see how well test results do agree with later school performance over a period of years.

Two bases of prediction: IQ and mental age. In studying this question, there are two methods of approach: (1) the

¹ See Chapter XI for discussion of the method of certification current in the Oakland and Berkeley schools.

IQ; (2) the mental age. As already indicated, the IQ is an index of relative brightness which makes it possible to compare any child with a normal child. If a pupil in the first grade, six years of age chronologically, has an IQ of only 75, the probability is that he will continue throughout his mental growth to have a mental age which is approximately only 75 per cent of his chronological age, with corresponding retardation resulting in his school work. Therefore, if the mental test results are reliable, the IQ of a child entering school should be an indication of the type of progress which he will make in his school work; i.e., slow, normal, or rapid.

However, the IQ, if considered alone, cannot indicate the *grade* in which the child is able to work satisfactorily. Mental age is the basis of judging present capacity for accomplishment. For example, if we are told that a child has an IQ of 80, we know nothing as to his absolute mental ability. We have only in terms of per cent the ratio of his ability to normality. His mental age, whatever it may be, is 80 per cent of his chronological age, whatever that may be. Add, however, the information that the child is chronologically ten years old, and immediately we have a basis for determining tentatively his grade location. A ten-year-old child with an IQ of 80 has a mental level of eight years, and would therefore, under favorable working conditions, be able to accomplish satisfactory results in the second or low-third grade. It is thus that the mental age of the child as determined by a Binet test in kindergarten or first grade may be used to predict where he should be doing reasonably satisfactory work several years after the time of the test.

Prediction on the basis of IQ. (1) *Kindergarten children.* Seventy-six children tested in the kindergarten were followed in their school career for two years after the test had been given. These children were first divided into three groups according to their intelligence quotients: (a) below 90;

TABLE 18
SCHOOL PROGRESS OF 76 CHILDREN TESTED IN KINDERGARTEN
(Follow-up covers 2 years)

IQ	SLOW		NORMAL		RAPID		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Below 90	13	76.5	4	23.5	0	0.0	17	22.3
90-109	8	32.0	15	60.0	2	8.0	25	32.9
110 and above	3	8.8	20	58.8	11	32.4	34	44.8
Totals	24	31.6	39	51.3	13	17.1	76	100.0

Read the table thus: Of 17 kindergarten children testing below 90 IQ, 13 were retarded one term or more during the first two years of the school program; 4 made normal progress; none were accelerated; etc.

(b) 90-109; (c) 110 and above. The actual progress of each child for the two years was then traced and the subjects were classified on the basis of progress made as slow, normal, or rapid. Table 18 indicates the type of progress made by the children with various intelligence quotients.

It will be observed that the per cent of retardation decreases as the intelligence quotient increases. Of the 17 children testing below 90 IQ in the kindergarten, 13 failed of promotion one or more times during the two years following the test, while of the 34 superior children testing 110 or above, only 3 were retarded during the follow-up period. On the other hand, 11 of these 34 superior children were able to make rapid progress, while not one of those testing below 90 IQ covered more than one term's work in six months. Of the group of children testing from 90 to 109 IQ, representing those having normal capacity, 60.0 per cent also made normal progress. The general trend as indicated by the table is evident; i.e., an inferior IQ, as determined by a mental test given in the kindergarten, usually means retardation at the very beginning of a child's school life, while a superior

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TABLE 19
SCHOOL PROGRESS OF 95 CHILDREN TESTED IN LOW-FIRST GRADE
 (Follow-up covers 2 years)

IQ	SLOW		NORMAL		RAPID		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Below 90	27	87.1	4	12.9	0	0.0	31	32.6
90-109	18	36.7	26	53.1	5	10.2	49	51.6
110 and above	0	0.0	7	46.6	8	53.4	15	15.8
Totals	45	47.4	37	38.9	13	13.7	95	100.0

Read the table thus: Of 31 low-first-grade children testing below 90 IQ, 27 were retarded one term or more during the first two years after the test was given; 4 made normal progress; none were accelerated; etc.

IQ means at least normal advancement, with possibility of acceleration if provision for it is made. In other words, the mental test result furnishes a valuable index of a child's chances for success in school work.

(2) *Low-first-grade children.* Ninety-five children tested in the low-first grade were traced for two years, with the results given in Table 19.

The figures of Table 19 show an even higher degree of accuracy for the mental test in predicting school success than appeared for kindergarten children. Over 87 per cent of those testing below 90 IQ were retarded during the two years following the test, while the children testing 110 or above all made either normal or rapid progress. As with the kindergarten group, so here, an IQ of from 90 to 109 appears slightly more doubtful in predicting progress than those either below or above this figure, and naturally so. This represents the group of children of average capacity, but with whom other factors, such as health, school attendance, industry, temperament, and various environmental conditions, may influence progress, usually toward retardation. The chances are a

TABLE 20
SCHOOL PROGRESS OF 90 CHILDREN TESTED IN HIGH-FIRST GRADE
(Follow-up covers 2 years)

IQ	SLOW		NORMAL		RAPID		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Below 90	44	86.3	6	11.8	1	1.9	51	56.6
90-109	16	48.5	12	33.3	5	15.2	33	36.7
110 and above	0	0.0	1	16.7	5	83.3	6	6.7
Totals	60	66.7	19	21.1	11	12.2	90	100.0

Read the table thus: Of 51 high-first-grade children testing below 90 IQ, 44 were retarded one term or more during the two years following the test; 6 made normal progress; 1 was accelerated; etc.

little more than three to one that children of this group will be retarded rather than accelerated. It is a matter of frequent occurrence for a child of just average ability, through unfavorable circumstances, to accomplish less than his capacity warrants, but it is not so easy a matter for him to make rapid progress, except as it may come through sheer force of effort with the application of excessive time or with help in his school work. Such cases have occurred, but they are comparatively rare.

(3) *High-first-grade children.* Ninety children tested in the high-first grade were found in the same school two years later. Table 20 shows their progress.

The group represented in Table 20 included a larger number of pupils of inferior ability, as determined by the test, than did either the kindergarten or low-first group. Hence we should expect a correspondingly larger percentage of retardation during the two years following the test. Such was actually the case. Two thirds of the entire group (66.7 per cent) failed of promotion at least once during the follow-up period. When we consider the three divisions formed on

TABLE 21
SCHOOL PROGRESS OF 52 CHILDREN TESTED IN LOW-FIRST OR
HIGH-FIRST GRADE

(Follow-up covers 4½ years)

IQ	SLOW		NORMAL		RAPID		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Below 90	35	94.6	2	5.4	0	0.0	37	71.1
90-109	6	50.0	6	50.0	0	0.0	12	23.1
110 and above	0	0.0	2	66.7	1	33.3	3	5.8
Totals	41	78.8	10	19.2	1	1.9	52	100.0

Read the table thus: Of 37 children testing below 90 IQ in low-first or high-first grade, 35 were retarded one term or more during the four and one-half years following the test; 2 made normal progress; none were accelerated; etc.

the basis of the IQ, the same facts appear which have already been noted with reference to the other two groups. The child in the high-first grade with an IQ below 90 had 86 chances out of 100 for failure of regular promotion in the next two years, with only 2 chances out of 100 for rapid progress. On the other hand, the child with an IQ of 110 or above had 83 chances out of 100 for rapid advancement and no chance of failure. The very fact that this group as a whole is below normal in mental ability tends to make the superior child stand out by way of contrast, thus bringing him more prominently into line for rapid advancement.

(4) *52 low-first- and high-first-grade children.* If two years of follow-up study show a close relationship between IQ and school progress, will this hold true for a longer period? Does the same degree of accuracy for predicting school success hold true when we trace the child's progress for four or five years? This question is answered in Table 21, which shows the results of following for four and one-half years the prog-

TABLE 22
GRADE PLACEMENT IN RELATION TO MENTAL AGE

CHILDREN TESTED IN	MENTALLY			Total No.
	Over-Age No. %	At-Age No. %	Under-Age No. %	
Kindergarten	31 40.8	35 46.0	10 13.2	76
Low-first	31 32.6	46 48.5	18 18.9	95
High-first	12 13.3	40 44.4	38 42.2	90

Read the table thus: Of the 76 children tested in the kindergarten, 31, or 40.8 per cent, were mentally over-age for the grade in which they were working two years after the test was given; 35, or 46.0 per cent, were mentally at-age; 10, or 13.2 per cent, were mentally under-age; etc.

ress of 52 children who had been tested in the low-first or high-first grade.

Three significant facts appear in Table 21: (1) total absence of rapid progress for any child testing below 110 IQ; (2) almost 100 per cent retardation for all children testing below 90 IQ; (3) even division between slow and normal progress for those testing between 90 and 109 IQ. Superior children (110 IQ or above) are almost entirely lacking in this group; hence, according to test results, there is little chance for acceleration. Subsequent facts during the four and one-half years following the test bear out to a remarkable degree the prediction given in the first year of the child's school life.

Prediction on the basis of mental age. The IQ is clearly a good indication of the general type of progress that may be expected of a child during the years following the test. The next point for consideration is the mental age of the child in relation to his grade placement several years after the test was given. Does the child's school progress correspond to his mental age development? Given the child's IQ and his chronological age, his mental age at any later time can al-

ways be determined by multiplying C. A. by IQ.¹ This was done for all the children in the kindergarten and first-grade groups whose school records were being traced for two years. Each child's mental age at the end of the follow-up period was computed on the basis of the IQ earned at school entrance. This mental age was then compared with his grade location, and he was rated accordingly as mentally over-age, mentally at-age, or mentally under-age.² Table 22 (page 77) shows the conditions two years after the tests were given.

There is one important point in which the records of all three groups (i.e., kindergarten, low-first, and high-first) agree; only from 45 per cent to 50 per cent of the children concerned, two years after being tested, were in the grade in which their mental ages would place them. What became of the rest? They were divided between the mentally over-age and the mentally under-age groups in general proportion to the number of superior and inferior IQ's found. In the kindergarten group of 76 children, for example, 45 per cent had IQ's of 110 or above; two years later the majority of these had a mental age above that of the grade in which they were working, while comparatively few were mentally under-age. According to mental age, then, a large number of them had not worked up to capacity. At the other ex-

¹ Since $\frac{M. A.}{C. A.} = IQ$, by mathematical process

$$M. A. = IQ \times C. A.$$

² The following table indicates the mental ages of children who have been considered mentally "at-age" for given grade:

GRADE	M. A.	GRADE	M. A.	GRADE	M. A.
L-1	5-9 to 6-9	L-3	7-9 to 8-9	L-5	9-9 to 10-9
H-1	6-3 to 7-3	H-3	8-3 to 9-3	H-5	10-3 to 11-3
L-2	6-9 to 7-9	L-4	8-9 to 9-9	L-6	10-9 to 11-9
H-2	7-3 to 8-3	H-4	9-3 to 10-3	H-6	11-3 to 12-3

This gives a leeway of three months at both the upper and lower limits of what would be strictly termed the normal age for the grade. Any child mentally above the age for the grade in which he is working is considered mentally "over-age"; any child whose mental age is below the age for his grade is considered mentally "under-age."

treme, in the high-first grade, there was a predominance of inferiority in test results, 56 per cent having an IQ below 90. After two years' time mental under-ageness appeared in 42.2 per cent of the group, while only 13.3 per cent were mentally over-age.

Figures are significant only as they indicate facts and basic principles of action. The situation revealed by the figures in Table 22 is one of which every teacher should be cognizant. Wherever mental superiority exists in a class or in an individual, unless opportunity is given for acceleration, there necessarily develops in the course of a few years an increasing degree of mental over-ageness. If the superior child simply marks time by the side of the average pupils, spending a full year in each grade, it will not be long before his mental age will be far beyond that required for his actual grade placement. Such a child is being held to the pace of a draft horse, when by nature his capacity for speed is that of a racer.

On the other hand, inferiority in a class or in a pupil always means a struggle for the teacher. She makes desperate efforts to pull along with her all who can possibly make any progress, particularly those who are already chronologically over-age. Therefore, as we advance through the grades, we find increasing numbers of those mentally under-age pupils who do not possess the ability to do the work of the grade to which they have been assigned, but who have been promoted out of sheer kindness of heart.

It is significant that in the high-first-grade group under consideration, where the largest per cent of mental under-ageness existed two years after the test was given, 27 of the 38 pupils found mentally under-age were rated by their teachers as inferior or very inferior in school work. In the kindergarten group, where the greatest amount of superiority and consequent mental over-ageness existed, 20 of the 31 pupils who were above their grade in mental age were

rated by their teachers as superior or very superior in school work. They were showing their ability through excellent accomplishment in the grade in which they were placed, without being recognized, however, as capable of achieving just as excellent results in the next grade higher.

Fifty-two low-first- and high-first-grade cases. For the group of 52 low-first- and high-first-grade children who were followed for four and one-half years of school progress, similar statements can be made as to prediction of school success on the basis of the mental test plus case study in the first grade. The author made such prediction for each individual case at the time of testing, with the following results:

1. The progress made by the child (i.e., slow, normal, or rapid) was predicted correctly in 40 of the 52 cases studied.

2. Of the 12 cases where disagreement existed between prediction and actual progress, all but 2 can be explained on the basis of absence, illness, or unsatisfactory home conditions.

3. In a total of 50 cases, or 96 per cent of the whole number, therefore, predictions made in the first grade of progress to be expected during the following four years either were realized in the school life of the child or failed of realization through some known factor other than mental ability. This surely is conclusive evidence of the value of mental tests in predicting school progress.

Examples of test results in relation to school progress. Frances S. entered the low-first grade in January, 1918. C. A. 6-0; M. A. 8-8; IQ 144. In May of the same year she was promoted to the high-first grade, and in the next semester completed the work of that grade as well as the requirements of the low-second. In January, 1922, she had completed the high-fifth with excellent scholarship. Thus she accomplished five years' work in four years. Her chronological age during the term in the high-fifth grade was 10 years, while her mental age was above 14. The case illus-

trates the fact that a superior IQ furnishes a reliable basis for predicting accelerated progress, but that such progress all too frequently does not keep pace with the mental development of the child. There develops an increasing degree of mental over-ageness in the superior child who is given inadequate opportunity for acceleration.

Harriet S. entered the same school in January, 1918, at the age of 6-1; M. A. 5-8; IQ 93. Her school progress shows acceleration until she, too, was in the high-fifth grade four years after her school entrance. Here is a case where a child of apparently near normal capacity has made rapid progress. Why? Her teacher's explanation is that she is an "extremely hard worker." When we add to this the fact that her scholarship record for five consecutive terms was only a "Passed," and also the teacher's statement in the high-fifth grade that "she is beyond her depth now," we have evidence of the fact that hard work cannot take the place of innate mental capacity. Far better for Harriet if she had been allowed to proceed at the normal rate of progress as indicated by her mental test. She would have been saved the humiliation of getting to the place of discouragement where she was clearly "beyond her depth."

Owen B. entered the low-first grade at 6-1; M. A. 5-0; IQ 82. For the succeeding four years he showed a scholarship record rated "Poor" each term, with either a trial promotion or failure marking the end of every term's work, until, at the end of the four years, he was in the high-third grade, still "on trial," and one year retarded in progress. His less than 90 IQ at school entrance pointed toward just such retardation. Note, however, that, when in the high-third grade with a chronological age of 10, his mental age was only 8 years, or six months below that normally required to do high-third-grade work. The desire of his teachers, to pass him along, if only "on trial," resulted in a mental under-ageness

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that made it increasingly difficult for him to do anything like satisfactory work.

George L. entered the low-first grade at the age of 5-11; M. A. 7-4; IQ 124. Four years later he was found in the low-fifth grade, with a scholarship record of "Good" and "Excellent." Apparently he had made only normal progress. Why was he not accelerated when the school which he attended was giving special attention to its superior pupils? Investigation showed that he had been out of school for almost a year, and consequently he actually did make rapid progress considering the period of his school attendance. The probability is that if he remains in school regularly he will be further accelerated. Clearly, one needs to know the case history of each individual pupil before evaluating his school progress in relation to mental test results.

We could cite numerous other instances, notably those of the inferior child, who tests with an IQ below 80 at school entrance and in the years following seems altogether unable to profit by regular school instruction, thereby showing need of assignment to a special class. Such cases, however, will be treated in detail in Chapter VIII, which deals especially with the child of inferior capacity.

VALUE OF GROUP MENTAL TESTS FOR PREDICTION OF SCHOOL SUCCESS

There is no doubt remaining that the individual mental test is an instrument of great value in determining the grade in which a child can do satisfactory school work and in predicting the progress that he is likely to make. The time needed for its administration, however, is a factor which makes its exclusive use for this purpose very difficult. It is therefore necessary to consider the value of the group mental test as a basis for predicting subsequent school work, particularly in the case of the upper elementary and high school

grades, where the time demanded for an individual test makes its universal use almost prohibitive. How fully can we trust the group test results for prediction of future school work? Lack of space limits us here to a brief consideration of a single example,¹ — an example which represents, however, only one of many studies which have shown a reasonable accuracy of the group test for this purpose.

The Terman Group Test. The Terman Group Test of Mental Ability was given to 262 high-ninth-grade students in junior high schools of Berkeley, preparatory to their entering the tenth grade of the senior high school. On the basis of the test score a Group Intelligence Quotient (GIQ) was computed for each child, and a study was then made of the relationship of this GIQ to subsequent high school work. Two factors were considered: (1) type of course taken in the senior high school; (2) quality of senior high school work. The results of the study are given in Table 23 (page 84).

In Table 23 two definite tendencies appear:

(1) The pupils having high mental ratings almost universally enroll in the academic course; pupils having low ratings tend more often to take up commercial or vocational work.

(2) The percentage of excellent marks received in the tenth grade very rapidly diminished with the decrease of the GIQ rank as determined at the end of the ninth year, while the percentages of barely passing and unsatisfactory marks materially increased as the intelligence rank decreased. The pupils ranking A in intelligence had 39 chances out of 100 to make "1's" in their subsequent school work, while those ranking D in intelligence (there were no E's in high school) earned not a single "1." On the other hand, the D pupils received twelve times as many "4's," "5's," or "incomplete's" as the pupils of the A group. The low test scores and the

¹ Additional data on this point are given in Chapter X, dealing exclusively with the high school. (See p. 176.)

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TABLE 23

RECORDS OF 262 TENTH-GRADE PUPILS WHO HAD BEEN TESTED
IN NINTH GRADE

(a) *Type of course taken in the senior high school:*

MENTAL RANK AC- CORDING TO GIQ	No. PUPILS	ACADEMIC		COMMERCIAL		VOCATIONAL	
		No Pupils	Per cent of Pupils	No Pupils	Per cent of Pupils	No. Pupils	Per cent of Pupils
A (130 or above)	13	13	100.0	0	0.0	0	0.0
B (115-129)	60	57	95.0	2	3.3	1	1.7
C+ (105-114)	63	55	87.3	7	11.1	1	1.6
C (95-104)	67	46	68.6	18	26.9	3	4.5
C- (85-94)	41	25	61.0	11	26.8	5	12.2
D (70-84)	18	12	66.7	6	33.3	0	0.0
E (Below 70)	0	—	—	—	—	—	—
Total	262	208		44		10	

(b) *Quality of tenth-grade work:*

MENTAL RANK AC- CORDING TO GIQ	No. PUPILS	PER CENT OF 1's ¹	PER CENT OF 2's ¹	PER CENT OF 3's ¹	PER CENT OF 4's, 5's OR INC. ¹
A (130 or above)	13	39.2	48.2	10.7	1.8
B (115-129)	60	18.6	57.2	16.9	7.1
C+ (105-114)	63	12.9	44.3	28.2	14.4
C (95-104)	67	8.7	40.8	33.5	16.9
C- (85-94)	41	10.6	42.6	31.4	15.4
D (70-84)	18	0.0	31.7	46.0	22.2
E (Below 70)	0	—	—	—	—
Total	262				

Read the table thus:

(a) The 13 pupils with a mental rank of A all enrolled in the academic course at the senior high school; of the 60 pupils with a mental rank of B 57 enrolled in the academic course, 2 in the commercial course, and 1 in the vocational course; etc.

(b) Of the term marks received in the tenth grade by the 13 pupils with a mental rank of A, 39.2 per cent were "1," 48.2 per cent were "2," 10.7 per cent were "3," and 1.8 per cent were "4," "5," or "Inc.," etc.

1 = Excellent	4 = Condition
2 = Satisfactory	5 = Failure
3 = Passing	Inc. = Incomplete

high test scores show a very definite correlation with low and high school marks.

When we examine the C, C+, and C- groups (those representing approximately normal ability), we find something that has already been noted in the case of the lower grades; i.e., that factors other than intelligence appear to enter prominently in producing variation in school marks. Success or failure of the normal child is dependent quite as much upon effort, interest, and environmental influences as upon native capacity.

One of the most intensive studies in this connection is that made by W. M. Proctor of Stanford University, in which he considers "Psychological Tests and Guidance of High School Pupils."¹ After presenting extensive data, he concludes that "individual and group mental tests have been shown to be sufficiently reliable to justify their use as aids in determining the mental level of high school pupils. Group tests, such as the Army Group Examinations, 'a' and Alpha, make possible a preliminary mental survey of an entire high school population at the beginning of a school year. The resulting scores will be found to be of great value in grouping the pupils according to ability. Such tests should always be supplemented by every other possible means of discovering the mental level. The results should be considered tentative and subject to revision in the light of later developments."

SUMMARY

1. Numerous studies point to the fact that the IQ remains relatively constant; that is, if two tests are given to the same person at different times, the results are approximately the same, regardless of the age or intelligence of the subject or of the time interval elapsing between the two tests.

2. The IQ, as determined by an individual test at school entrance, furnishes a valuable index of a child's chances for

¹ See references at end of chapter.

success in school work. An IQ below 90 usually means retardation at the very beginning of a child's school life, while an IQ of 110 or above means at least normal advancement, with possibility of acceleration if provision for it is made.

3. While the mental age reveals the level of mental ability necessary for grade accomplishment, two factors are operative in producing grade classification at variance with capacity. The first of these is the difficulty, arising from school administrative machinery as well as from the attitude of teachers, in furnishing adequate opportunity for the advancement of the superior child in accordance with his mental growth. The second factor is the tendency to permit the inferior child to pass on to the next grade after a given amount of time served, even though he is not actually ready for the advanced work. The result, as we go up through the grades, is an ever increasing amount of actual retardation (mental over-ageness) of the superior child and actual acceleration (mental under-ageness) of the inferior child.

4. Group mental tests in the upper elementary grades and in high school possess practical value in making classification on the basis of ability and in predicting the degree of school success to be expected.

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CHAPTER SIX

USE OF MENTAL TESTS BY KINDERGARTEN AND PRIMARY TEACHERS

MENTAL testing cannot be justified as having any place in the school program unless it bears fruit in better education for the children. Can the classroom teacher be trained to use mental test results safely? Is it safe for her even to have test results? Can she be trained to do mental testing? All these are questions that have repeatedly arisen, and concerning which there is still difference of opinion.

RESPONSIBILITY OF THE CLASSROOM TEACHER

Teacher responsible for discovering child capacity and needs. We firmly believe that mental testing cannot function as it should in our schools until teachers are trained in the intelligent use of test results. We likewise believe that under proper guidance many can and should do the testing.¹ The classroom teacher is the one who comes into the closest relationships with the school child. Upon her rests the largest responsibility for classification, for the promotion or non-promotion of children. She determines in large measure the assignments of lessons and she passes judgment upon the responses which the child makes to those assignments. She has or should have a large share in determining the course of study. She should, therefore, have the chief responsibility in discovering the child's capacities and needs.

Need of standard measurements. Teachers are human. Their opinions or judgments concerning the ability, accomplishment, or needs of a child are subject to a number of influences, chief among which are professional training and professional experience. The teacher judges a child by what

¹ See Chapter XI for further discussion of the plan for training teachers.

she has learned about children and from children. Unless she has made use of some form of standard measurement, her standards are personal and colored by her experience. There is undoubted need for impersonal standards. She should have a means of judging a child, not merely by comparison with the rest of the children in the room, nor even by the memory she has of all other children she has known, but by comparison with a large unselected group of children representing all types of variations found among those of the child's own age. Such judgments, freed completely from personal opinion or personal experience, can be made by means of standardized measurements. Every teacher is familiar with the standards for measuring age, height, and weight of children. She can easily obtain such standards (frequently called norms) for height or weight at a particular age. With standard tests of accomplishment in subject matter she can compare the work of a child in reading or spelling or arithmetic with that of children of the same age or grade in other schools. She can thus secure evidence on subject mastery which is far more trustworthy than personal opinion. In the same way the mental ability of her pupils can be compared with the standard or norm if the necessary data are furnished or if the teacher is trained to make the mental tests and secure the data for herself. Standardized mental test data are obtained in the same way as data for subject accomplishment or for height or weight; i.e., by following a standard procedure in measuring and scoring. The technique of giving and scoring mental tests can be mastered by an intelligent teacher, even by one who has little knowledge of psychology, provided she is willing to follow directions carefully.

Need of testing at school entrance. Mental tests should be used for all children at the time of entrance into school or soon after. At present we must rely chiefly upon the individ-

ual test for the kindergarten and first grade, since there are very few group tests for these grades which have been developed to the place where they show even fair reliability for general use in classification.

Need of care in using test results. The greatest difficulty and the greatest danger come not from giving the test but from the handling of results. A nurse may take and record the temperature, pulse, and blood pressure of a patient; she may know when any one of them is above or below normal, or when a danger point has been reached; but it is far more difficult to determine what ought or ought not to be done. For this there is need of a physician. Similarly a teacher may obtain a test result that indicates mental capacity above or below normal, but what should be done with respect to the child's placement or instruction is a matter that needs to be decided with the greatest care. The teacher must realize that the mental test is not infallible; also, that there are many factors other than general intelligence to be considered in the education of a child.

THE KINDERGARTEN

What do tests made in the kindergarten reveal? What benefits are derived from testing in the kindergarten? The chief benefit gained is the prompt understanding it gives of some of the most important mental characteristics and of the probable achievements of each child in the room. A teacher will often discover capacities in a thirty-minute mental test that would not be revealed in weeks or even months of classroom work. The test furnishes an objective basis as a starting point for further observation,—in other words, a basis independent of the personal opinion of the teacher, parent, or others. This impersonal basis in no way prevents the formation of personal judgments, but serves as a check upon their accuracy. The tests frequently reveal a brightness that

is concealed by a cloak of timidity. They show that talkativeness and a forward manner do not always signify real thinking power. They lead to the discovery of children with good mental ability, but whose class behavior shows little or no training for its use. They reveal some children so immature in mentality and others so mature that they constitute misfits when confronting the tasks designed for average ability. We have found children from three-year mental level to eight-year mental level working together for a whole year in the same kindergarten class.

Typical errors in judging brightness. Recently we discovered by mental test one of the most capable pupils in the city. He had been in our schools for four years and no teacher had discovered his mental superiority. He was timid and sensitive, always doing his work satisfactorily but never forcing himself to the front. When his superior ability was discovered and he was given encouragement, he quickly developed into a position of leadership. Such a child would be discovered in the kindergarten or first grade in any school where mental tests were carefully applied.

We asked a kindergarten teacher to select the brightest child in her class. The child tested normal; many others in her class tested higher. The teacher, after more careful observation, decided that she had probably chosen the child most free to talk, unafraid and natural, with good manners and refinement, and willing to do or to try whatever the teacher asked. A follow-up for three years proved that the teacher's revised judgment was right, and that the little girl in question had about average ability.

The tests often reveal good ability in a child like Mary, who was the pampered, petted, selfish, and spoiled only daughter of wealthy and indulgent parents. Mary seemed unable to do anything in school except to show her disposition. Her chief training at home involved directing servants

TABLE 24a

AGE AND MENTAL AGE DIFFERENCES AMONG KINDERGARTEN CHILDREN
(Oakland Schools)

CHRONOLOGICAL AND MENTAL AGE INTERVALS	NO. CASES (CHRONOLOGICAL AGE)	NO. CASES (MENTAL AGE)
2-6 to 2-11		2
3-0 to 3-5	2	6
3-6 to 3-11	2	29
4-0 to 4-5	13	46
4-6 to 4-11	51	79
5-0 to 5-5	185	136
5-6 to 5-11	576	260
6-0 to 6-5	293	292
6-6 to 6-11	42	222
7-0 to 7-5	17	98
7-6 to 7-11	4	19
8-0 to 8-5	3	3
8-6 to 8-11	1	
9-0 to 9-5	3	
Total	1192	1192
Median	5-8	6-0

Read the table thus: In the chronological age interval 3-0 to 3-5 are 2 children; in the same mental age interval are 6 children; etc.

to do her bidding and forcing parents to observe her whims. Very naturally she had not developed a spirit of social co-operation or habits of physical or mental industry. She had little training in the use of the superior mind which she seemed to possess. The kindergarten teacher may have a difficult task to give Mary's mind an opportunity for natural development in the face of such outside influence, but the test has furnished evidence that there is a mental endowment on which to work.

Variation in the ability of kindergarten children. Tables 24a and 24b show the distribution of mental ages and IQ's

TABLE 24*b*
IQ DIFFERENCES AMONG KINDERGARTEN CHILDREN

IQ INTERVAL	No CASES
40-44	1
45-49	2
50-54	3
55-59	11
60-64	15
65-69	15
70-74	18
75-79	36
80-84	51
85-89	71
90-94	112
95-99	102
100-104	163
105-109	160
110-114	160
115-119	120
120-124	76
125-129	38
130-134	22
135-139	9
140-144	4
145-149	2
150-154	1
Total	1192
Median IQ	105

Read the table thus: In the IQ interval 40 to 44 is 1 child; in the interval 45 to 49 are 2 children; etc.

of 1192 kindergarten children. The lowest child tests mentally 2-11, while the highest tests 8-5; there is a difference of five and one-half years between these two extremes.

Tables 24*a* and 24*b* indicate in a fair way the nature of the problem that confronts the kindergarten teacher. She is to train these children for one year in some manner that is edu-

cational and helpful.¹ At the end of the year they are all supposed to go into the first grade; by law in most states they may if they are six years old.

In no other grade (except in the first grade in schools where there is no kindergarten) will there be found such a wide range of individual differences. Into the kindergarten are thrown children from everywhere with only one prerequisite. Here are the large and the small, the clumsy and the skillful, the select and the slum, the home-trained and the Topsy-like, the well-fed and the hungry, the English-speaking and the foreign, the mentally superior and the mentally inferior, with all the intervening stages in each range mentioned. The only measuring rod that has been applied is that each shall have lived somewhere, somehow, in the big world of space for approximately five years of time by the calendar.

Variation in needs of kindergarten children. The educational needs of these children will vary as widely as their looks, height, or weight; more widely than the clothes they wear. They cannot justly be treated alike. One duty of the kindergarten teacher is to discover the individual differences of her children, to develop in each those characteristics most desirable in fitting him into the large educational program ahead, both in the grades and in life outside the school. She should iron out those rough characteristics which handicap him in the fullest use of his ability. In a word, she should help the child to discover his best self. In addition to whatever else a kindergarten teacher may do, she should present to the first-grade teacher a classification of her children which will enable each child to move forward quickly in that type of work in which he can succeed. She should be able to designate those children who ought to be

¹ In this discussion we are considering the kindergarten that serves the child for one year (age 5 to 6 years) before first-grade entrance.

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placed in the division for more than average accomplishment, and those not able to cope with the difficulties of regular first-grade work.

Our graded system in the past has been based upon the principle of classification into groups of similar ability, such as, first grade, second grade, etc.; but it has also been constructed upon the theory that all children should pass through the same educational program in the elementary grades. We freely accept the first principle and use every means at our disposal to classify into grades or groups for similar work, but the wide range of individual differences in children makes us challenge the theory that all should pass through the same educational course, even in the elementary grades. Democracy implies equality of opportunity. This means that every child in our schools should have the opportunity from the very first to work at tasks which are commensurate with his mental ability. As nearly as possible we should adapt our education to the needs of all children from the very first day they enter school.

Classification for kindergarten work. A Binet test should be given to each child as soon as possible after entering the kindergarten, provided he speaks English reasonably well. The teacher should use the test result in her study of the needs and grouping of her pupils. Usually, as a kindergarten teacher tries to classify for her own work or for the first grade, she will discover children representing one or more of the following types:

1. Those chronologically and mentally between five and six years and constituting therefore the typical kindergarten children.
2. Those chronologically five years or over, but mentally below five years, who cannot do satisfactory work either in the kindergarten or first grade.
3. Those who are over six years mentally and who are

apparently ready for first grade long before the kindergarten term and the kindergarten age have been completed.

4. Those who are six or seven years old, but mentally unable to do first-grade work.

The kindergarten teacher should handle these conditions in the best way open to her while the children remain in her care, making such grouping as her program permits, and passing her information on to the first-grade teacher at the end of the term. Every community has its own special problems which must be met. The following suggestions may be adaptable or usable in part :

1. The pupils (Group 2 above) chronologically at-age but mentally below five may be excluded from regular kindergarten, either to remain at home for a term or to be formed into a junior kindergarten division or class.

2. Those mentally above six and physically capable should be given an enriched kindergarten experience quickly leading either into first-grade work or into a type of kindergarten work which is broad enough to utilize their superior ability, thus developing habits of mental industry.

3. Those chronologically over six but so retarded mentally that they are unable to do first-grade work do not ordinarily belong in the kindergarten as repeaters. (If they have never been in kindergarten, they might be tried there.) Neither do they belong in a regular first grade. They should be in a special division of the first grade with a modified program to fit their powers of accomplishment.¹

THE FIRST GRADE

Differences among first-grade children. Just as in the kindergarten a wide range was found between the extremes of mental ability, so in the first grade similar variation exists.

¹ See Chapter VIII, dealing with the inferior child.

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TABLE 25a

AGE AND MENTAL AGE DIFFERENCES AMONG FIRST-GRADE
CHILDREN

(Oakland Schools)

CHRONOLOGICAL AND MENTAL AGE INTERVALS	NO CASES (CHRONOLOGICAL AGE)		NO. CASES (MENTAL AGE)	
	Low-first	High-first	Low-first	High-first
Below 3			1	
3-0 to 3-5			8	
3-6 to 3-11			18	
4-0 to 4-5			56	
4-6 to 4-11			145	8
5-0 to 5-5	5		278	21
5-6 to 5-11	243	7	520	75
6-0 to 6-5	1221	83	735	176
6-6 to 6-11	855	289	741	237
7-0 to 7-5	445	235	449	271
7-6 to 7-11	205	167	192	160
8-0 to 8-5	120	122	49	85
8-6 to 8-11	51	78	14	32
9-0 to 9-5	22	35	6	11
9-6 to 9-11	12	25		4
10-0 to 10-5	11	15		1
10-6 to 10-11	7	10		
11-0 to 11-5	3	9		
11-6 to 11-11	5	2		
12-0 to 12-5	3	2		
12-6 to 12-11	2	2		
13-0 to 13-5	2			
13-6 to 13-11				
Totals	3212	1081	3212	1081
Medians	6-6	7-2	6-4	7-0

Read the table thus: The *chronological* age interval, 5-0 to 5-5, includes 5 children in the low-first grade, none in the high-first; the *mental* age interval, 5-0 to 5-5, includes 278 children in the low-first grade and 21 in the high-first; etc.

TABLE 25*b*
IQ DIFFERENCES AMONG FIRST-GRADE CHILDREN

IQ INTERVALS	NO. CASES (LOW-FIRST)	NO. CASES (HIGH-FIRST)
40-44	4	2
45-49	7	1
50-54	15	4
55-59	35	9
60-64	52	19
65-69	69	34
70-74	144	48
75-79	200	68
80-84	283	103
85-89	343	121
90-94	429	132
95-99	398	141
100-104	418	142
105-109	305	95
110-114	218	69
115-119	155	31
120-124	83	29
125-129	29	18
130-134	16	13
135-139	5	1
140-144	4	1
Totals	3212	1081
Medians	95	95

Read the table thus: The IQ interval, 40 to 44, includes 4 children in the low-first grade and 2 in the high-first; etc.

Tables 25*a* and 25*b* contain the distribution of the ages, mental ages, and intelligence quotients of 3212 low-first-grade pupils and of 1081 high-first-grade pupils, all of whom were tested by the Stanford-Binet test in the Oakland schools. In the low-first grade the chronological age range extends from 5-4 to 13-2 (median 6-6); the mental ages extend from 2-10 to 9-4 (median 6-4); the intelligence quotients vary from 41 to 144 (median 95). In the high-first grade the

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ranges are as follows: C. A., 5-6 to 12-10 (median 7-2); M. A., 4-6 to 10-2 (median 7-0); IQ, 42 to 140 (median 95). Thirty-one and nine tenths per cent of children in the low-first grade have mental ages below six; 22.1 per cent are mentally above seven. Even in the high-first grade 9.6 per cent are below six in mental age, while 12.3 per cent are mentally above eight. Consider the problems of the first-grade teacher in adjusting her teaching to such wide ranges in ability. She faces the necessity of making some kind of classification which recognizes these differences.

Classification. If there is no report available from the kindergarten teacher, the first-grade teacher should begin her study of the child just as did the kindergarten teacher. She has a course of study laid down for the regular first grade. This is based upon the mental ability of the normal six-year-old. Unless her pupils are a selected group, she will have from 15 per cent to 30 per cent who will be unable to do the work in the allotted time. She must plan for effective working groups. Most first-grade teachers will be able to classify into three groups: (1) those able to do more than is required by the course of study; (2) those who can do the standard work with reasonable effort; (3) those who cannot do the regular work. Whether she has these three groups or not, she has individuals whom she knows correspond to these classifications and who must be handled accordingly if they are to receive fair treatment.

The kindergarten has not yet assumed the responsibility for classification, and, even if it should do so, the problem would not be solved, as only a fraction of all the children attend kindergarten. Therefore the first grade becomes the place where classification begins in earnest. All who are six years old may enter the mill; only those who are able to take on a certain polish of reading, number, and language can slip through the screen that separates the first-class grain from that of the

second-class. Naturally, then, we may expect what is always found in school surveys; i.e., that the first grade has a larger percentage of failure than any other grade in the school.

Collection of data concerning first-grade pupils. During the first year a teacher can collect for each child data of much value for the classification of her pupils. The following facts are significant and are nearly always available:

1. Chronological age.
2. Mental age.
3. Intelligence quotient.
4. Grade.
5. Accomplishment in school work.
6. Application or industry.
7. Health.
8. Home environment.
9. Nationality and language difficulty.
10. Special or unusual conditions bearing upon school success.

Table 26 (page 100) contains the data arranged by a certain first-grade teacher near the middle of the term. She furnished all information except the M. A. and IQ; these were supplied by an outside examiner. What help can she get from a study of the table?

Here are 38 pupils, 11 in the high-first grade and 27 in the low-first. All in the high division are repeaters except one; the age range in years and months is from 6-8 to 11-0; M. A. from 5-1 to 7-5. The theoretical age standard for finishing the first grade is approximately 7-0. With reference to age, numbers 1, 2, 4, 5, and 7 are practically normal; the rest are from one-half year to four years over-age. With reference to M. A., numbers 1, 2, 3, 4, 6, and 11 are approximately normal; the rest are below normal from one-half year to two years. With reference to IQ we have a range from 51 (doubtless an institutional case of feeble-mindedness) to 105 (slightly above normal). One pupil, number 10, is

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TABLE 26. DATA FOR FIRST-GRADE PUPILS*

No. of Child	SEX	C A.	M. A.	IQ	SCHOOL WORK	T's EST OF INT.	GRADE	YEARS IN SCHOOL	LANG.
1	g	6-8	7-0	105	C	C	H-1	$\frac{1}{2}$	English
2	g	7-3	7-2	99	C	C	H-1	$1\frac{1}{2}$	English
3	b	7-7	7-5	98	C	C	H-1	$1\frac{1}{2}$	English
4	b	7-4	7-0	95	D	D	H-1	$1\frac{1}{2}$	English
5	g	7-0	6-6	93	D	D	H-1	$1\frac{1}{2}$	English
6	b	7-8	6-10	89	D	D	H-1	$1\frac{1}{2}$	Italian
7	g	7-5	6-0	81	D	D	H-1	$1\frac{1}{2}$	Spanish
8	b	8-0	6-0	75	C	D	H-1	$1\frac{1}{2}$	English
9	b	8-6	6-4	74	D	D	H-1	$1\frac{1}{2}$	Italian
10	g	10-0	5-1	51	E	E	H-1	$3\frac{1}{2}$	English
11	b	11-0	6-10	62	C	C	H-1	4	English
12	b	5-10	6-10	117	B	B	L-1	$\frac{1}{2}$	English
13	b	5-9	6-6	113	B	B	L-1	$\frac{1}{2}$	English
14	b	5-10	6-0	103	C	C	L-1	$\frac{1}{2}$	English
15	b	5-11	6-2	104	C	C	L-1	$\frac{1}{2}$	Italian
16	g	5-10	6-0	103	C	C	L-1	$\frac{1}{2}$	Italian
17	b	6-0	6-4	105	C	C	L-1	$\frac{1}{2}$	English
18	g	6-8	6-10	102	C	C	L-1	1	English
19	g	6-7	6-4	96	C	C	L-1	1	Italian
20	b	6-8	6-8	100	C	C	L-1	1	Italian
21	b	6-4	5-7	88	C	C	L-1	1	Italian
22	g	6-7	6-0	91	C	C	L-1	1	Portuguese
23	b	6-9	6-2	91	C	C	L-1	$\frac{1}{2}$	English
24	b	7-4	6-6	89	D	D	L-1	1	—
25	b	6-2	5-4	86	D	C	L-1	$\frac{1}{2}$	English
26	b	8-2	6-8	82	D	D	L-1	2	Spanish
27	b	6-2	5-0	81	E	D	L-1	$\frac{1}{2}$	Portuguese
28	g	6-6	5-4	82	C	C	L-1	1	Italian
29	b	6-11	5-7	81	C	C	L-1	1	Italian
30	b	6-10	5-6	80	D	C	L-1	1	Italian
31	g	6-1	4-10	79	D	D	L-1	$\frac{1}{2}$	English
32	g	6-3	4-8	75	E	E	L-1	1	English
33	g	6-1	4-8	77	E	E	L-1	$\frac{1}{2}$	Spanish
34	b	6-1	4-8	77	E	E	L-1	$\frac{1}{2}$	Italian
35	b	7-7	5-4	70	E	E	L-1	$1\frac{1}{2}$	Portuguese
36	b	6-11	5-3	76	D	D	L-1	1	English
37	b	10-1	4-6	45	E	E	L-1	4	English
38	b	6-0	4-8	78	D	D	L-1	$\frac{1}{2}$	English

* For explanation of column headings in table see foot of page 101.

rated by the teacher as doing very inferior work; the rest are average or inferior in accomplishment.

Correct use of M. A. and IQ. In using data of the kind shown in Table 26, it is necessary for the teacher to keep clearly in mind the distinction between M. A. and IQ. M. A. is an index of a child's present level of mental development, and hence the first basis for proper placement. We have a right to expect a child to be able to do the work in the grade normal to his M. A. unless there are disturbing factors. IQ, however, shows relative brightness. The IQ alone is no more of an index of the grade in which a child belongs than the word "bright" would be. It is therefore absurd for a teacher to say, "This child cannot do the work in my grade because he has an IQ of 80." The IQ must be considered along with age and mental age in order to have any significance in classifying school children by grades.

Since the mental age is one of the most significant factors in proper placement, the teacher will do well to make that the starting point for her study of agreements or disagreements in data. The child is supposed to enter the first grade at 6 years of age; he should finish at approximately 7 years. Therefore, 6-9 is the approximate mental age standard for the high-first group at the time the table was arranged (two and one-half months before the end of the term).

Sex. "b" means boy, "g" means girl.

C. A. Chronological age.

M. A. Mental age.

IQ. Intelligence quotient.

School Work. General average of school success as rated by teacher on 5-point scale.

T's Est. of Int. Teacher's estimate of child's general mental ability as compared with average children of same age. (Rating on 5-point scale.)

Grade. "H-1" means high-first grade; "L-1" means low-first grade.

Years in School. "1" means that child is now in his second half-year in school; "1½" means that he is now in his third half-year in school; etc.

Lang. Language used in the home.

Consideration of individual cases in high-first grade (Table 26). Child No. 1 is normal for the grade as to C. A., M. A., and normal in IQ; is doing average school work, and although this is his first half-year in school he has finished the low-first and is in the high-first grade. Is this due to the fact that he appears superior by comparison with the rest of the pupils, who are dull?

Child No. 2 is slightly above normal for the grade in both C. A. and M. A., normal in IQ, average in school work and in teacher's estimate of intelligence, speaks English, but has spent one-half year extra time in the first grade. Why?

Nos. 3 and 4 are both similar to No. 2. No teacher should be content until she has a satisfactory explanation of the fact that these children have required an extra half-year to finish the first grade.

No. 8, a boy eight years old with six-year mental age, IQ 75, has spent more than a year in the first grade. He is doing average work, although the teacher recognizes that he is below average in intelligence. This boy speaks English as his native tongue and he apparently began first-grade work when he was about 6-8 or 6-10. This late entrance doubtless was much to his advantage in helping him to finish the first grade in one and one-half years, although he is mentally below normal for the grade. A child who is kept many months struggling unsuccessfully with work that is beyond his ability is, of course, likely to develop an attitude of discouragement and of antagonism toward school, often to such an extent that he fails to use effectively even the limited ability which he has.

No. 9 is similar to No. 8, chronologically over-age and mentally under-age, but passing with a low school mark after repetition of the grade. Here, however, we have a foreign language, Italian, used in the home. This may be one handicap.

No. 10 is ten years old, but has a mental age of 5-1. She has been in the first grade more than three years and is still marked E, very inferior, in her work. The data would indicate that it is little short of criminal for both teacher and child, as well as for other pupils in the class, that this child should be required to try to do regular first-grade work. For almost three and one-half years she has "sat" in the first-grade room. In the past she has not caused "much trouble," but now the teacher reports her as "getting harder to manage." Is it any wonder? When one has tried almost daily for three and a half years tasks both uninteresting and impossible, if one has never received the stimulus that comes from winning in contest with others, perhaps the reaction characterized as "getting hard to manage" is the natural and inevitable thing.

No. 11 is a boy who has been almost four years in the first grade. He has a mental age normal to the grade, but his chronological age is four years above the standard. Note that he is doing average school work and that the teacher has rated him average in intelligence. But if he is eleven years old and were normal in mental ability for his age, he should be finishing the high-fifth grade. Why, then, has he been kept four years in the first grade, and why is he not accomplishing more than average school work? Does the fault rest with the child, with the teacher, or is the rating wrong? Ordinarily we would add, "Is the test result wrong?" but in this case the mental test is not at all involved, since the disagreement exists between chronological age and grade location. This is an excellent illustration of the failure of the teacher to take the age of the child into account in judging intelligence.

The eleven high-first-grade pupils of this division vary in M. A. from 5-1 to 7-5, in IQ from 51 to 105. The one problem which forces itself prominently into attention is that

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which concerns the handling of such pupils as Nos. 10 and 11. Is it right that they should be kept in a regular first grade for three or four years? Our answer is a positive "No." If there is a special class, they should be considered for it. If there is no special class, they should be encouraged to enter the first grade one or two years late, when mental development has reached more nearly the level required for successful work. If they must come to a regular first-grade room, and this will often be the case, the teacher and principal or supervising authority should arrange for a type of work which can be done successfully and which will not require the teacher to rob other children in the room of their rights by devoting an undue share of her time and attention to these.

Individual cases in low-first grade (Table 26). Let us next examine the data for the 27 pupils of the low-first section. The theoretical age standard (both C. A. and M. A.) at the middle of the first term in school is approximately 6-3. By mental age standard, Nos. 12 and 13 are above normal for the grade; by IQ they are in the superior group. Although by chronological age they are one-half year below standard, we readily anticipate from the test data what the teacher found true in the classroom; viz., superior accomplishment in the low-first grade.

It will not be necessary to discuss each individual case in the group to make clear to the reader the manner of analyzing and checking such tabulated data to bring out questions for further study. Let us note only a few outstanding cases of disagreement.

No. 18, a girl with C. A. and M. A. one-half year above standard for the grade, IQ normal, language English, is doing average school work, but is repeating the grade. Why? Likewise we question No. 20, who is normal in age and IQ, and yet is repeating the work. In this case, however, the

fact that Italian is the language spoken in the home may be a partial explanation of school failure.

No. 29, a boy with M. A. 5-7, IQ 81, is repeating the grade. He speaks Italian at home, but is rated average in school work and intelligence. This is better than would be expected from his mental age. The teacher should search until the reason has been found.¹

No. 38, a boy with M. A. 4-8, IQ 78, is in his first term at school. He is rated D in school work. Even this, however, is higher than the mental test would lead one to expect. We have found that teachers generally hesitate to use the ratings at either extreme of the scale (A or E); otherwise this child would probably have been rated E.

DISAGREEMENT BETWEEN TEST RESULT AND SCHOOL WORK

Every child in the entire class, whether kindergarten or first grade, should be carefully studied by the teacher to see if all the data agree. Wherever disagreement occurs, the teacher's attitude should be "Why?" She should always seek the real reason for a disagreement, not the proof of her own point of view. Sometimes the teacher's judgment has been in error; sometimes the test result is incorrect.

Error in teacher's judgment. A girl whom we shall call Mary² tested very high. The teacher in the first grade had rated her very low. Upon investigation it was found that she was extremely sensitive and timid, and that the teacher had had difficulty in getting a natural response. In later grades the girl developed out of her extreme timidity and revealed a brightness equal to that indicated by the mental test given in the first grade.

¹ Two years after this a retest showed an IQ of 93. The first test was probably incorrect, with language difficulty as a possible reason for the error.

² All the children mentioned in this book are real children, whether we give the real name or not.

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Error in test result. Errors in test results may arise from the inaccuracy of the examiner, language difficulty, environmental influences, or misrepresentation of age. Parents, wishing to get rid of children in the home, frequently send five-year-olds to the first grade, reporting the age as six. During one year we discovered eight such children in one first-grade room. Although the mental age earned is not affected in such cases, the IQ is often seriously in error.¹ Since the IQ is important in the prediction of school progress, it is to be expected that there would be disagreement between such progress and any prediction made on the basis of an IQ computed from an incorrect age.

Apparent disagreement explained. Walter tested high in the first grade (IQ 124). He was chronologically at-age and doing superior work. In the second and third grades his teachers reported him inferior in mentality and very inferior in school work. A case study revealed that father and mother were divorced shortly after the first mental test was made; the boy was roaming the streets with almost no attention from home. Frequently he stayed out all night, sleeping in a shed or box. He had developed bad tonsils and adenoids, and was so deaf that he had not been able to understand many of the assignments of the teacher. He was sensitive about asking again for what he did not understand. As a result, he became careless and indifferent. For a long time the teacher did not even know that he was almost deaf to her instructions. After two years he was again given a mental test. He earned an IQ eleven points below the first, although still above normal. With this evidence before her the teacher made a more careful study of proper avenues of approach. More care was given to the boy's position in the

¹ Since the $IQ = \frac{M. A.}{C. A.}$, any change in either the numerator (M. A.) or denominator (C. A.) of the fraction will produce a corresponding change in the quotient (IQ).

room, in order that he might be able to see and hear. More sympathy was given him because of the deeper understanding of his out-of-school life. Better attention was given to his physical condition. His throat and ears received medical treatment. More sunshine came into his soul and the boy's school work began to improve. After four years he had made up all lost promotions, and now, five years after the first test, he is doing excellent work in the grade in which he belongs by age.

What was responsible for Walter's change? A medical enthusiast would point to the remarkable effect produced by the removal of the tonsils and adenoids. An advocate of milk feeding would show conclusive proof of the benefits of the mid-morning glass of milk, for this was given at least a part of the time. The teacher who believes that love will win good work from any child would say, "See what happened when he knew that I loved him and when there was real understanding between us." The social settlement worker would point to the evils of the divided home and bad neighborhood environment. The advocate of the X method in reading or arithmetic would acclaim the wonderful results of the new method and urge its adoption. The psychologist would show that the mental test revealed a real capacity which had not been reached, thus establishing a problem to challenge all the psychological and pedagogical methods known to the teacher until the solution was attained. Let us try to be fair and allow due credit to any one or all of these possibilities, knowing that each may have contributed something. The case illustrates how important it is for the teacher to have as complete knowledge as possible concerning the child and to use those means of correction or of approach which are most effective.

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SUMMARY

1. In order that mental testing may function as it should in the lives of children, each kindergarten and first-grade teacher must be responsible for discovering the individual capacities and needs of her pupils.

2. Standardized tests are needed to supplement the teacher's judgment.

3. A mental test should be given to each child upon entrance to school, the result to be considered in conjunction with all other available data concerning him.

4. Individual differences found in the kindergarten and first grade demand that classification be made on the basis of brightness, with careful consideration given to both M. A. and C. A.

5. Every disagreement between test result and teacher's judgment should be checked to discover the cause. Such checking may involve months or even years of observation, but usually results in the discovery of a satisfactory explanation.

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CHAPTER SEVEN

MENTAL TESTS IN THE INTERMEDIATE AND UPPER GRADES ¹

SOME PROBLEMS OF THE UPPER GRADES

Ever widening range of mental ability. As pupils pass up from the primary grades, certain conditions are operative in school practices of gradation and promotion that produce with each succeeding grade wider and wider ranges of difference in mental ability between the best and the poorest pupils of a class. At the end of the term the common practice of the teacher is to promote all children who have been present regularly and have accomplished approximately the work required by the course of study. By this plan the brighter child of the first grade, whose capacity by nature develops more rapidly, and the average child, whose capacity by nature develops at a normal rate, will usually move forward together into the second grade, third grade, and so forth, although the differences in mental ability are steadily growing greater, with the inevitable result of marked variation in accomplishment in school subjects.

Another factor making these differences steadily greater is the tendency to promote the over-age child, even though his accomplishment may not be up to standard. In almost any classroom may be clearly demonstrated the truth of Terman's statement that it is the superior child who is retarded, and the dull child who is accelerated in school. The number of superior children thus retarded and the amount of retardation for each increases year by year as we go up the ladder of grades, due to any one or more of the numerous factors which prevent the child from working up to his ability. Similarly the number of dull children who

¹ Miss Marion C. Smith, Assistant Director of the Bureau of Research and Guidance, Berkeley, assisted in gathering data for this chapter.

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are accelerated¹ and the amount of acceleration for each tends to increase up to the fifth or sixth grade. Dull pupils accumulate in grades five and six because they do not have the mental ability to get through the meshes of the screen of the more formal phases of arithmetic, grammar, history, etc., requiring abstract reasoning. Some of these children reach the age of sixteen before they have completed the fifth grade, and consequently drop out of school. The number of such eliminations increases in each successive grade. By the time the eighth grade has been reached, we have remaining in school a select group. The per cent of over-age and slow decreases from about 40 per cent in grade five to from 25 per cent or 30 per cent in grade eight, although each of the intervening grades has contributed from 6 per cent to 10 per cent of failure. The elimination of over-age slow pupils is alarmingly large in these upper grades.

Mental ability vs. accomplishment. In the first grade, reading is the chief subject for study. As the pupil advances other subjects are added, such as arithmetic, language, spelling, writing, geography, history, etc. Each grade increases the content material on which the child must use his learning power. Therefore, as a child is promoted from year to year, the number of avenues through which he can show intelligent activity increases. It is but natural for a teacher to judge the child's intelligence by what he accomplishes in his subjects. Therein lies a danger which the mental test will help to remove. Term by term the child's accomplishment in the various subjects should be checked against his ability. In such checking, standard measurements become a necessity. Some form of tabulation or graphic representation makes for greater efficiency in the work, because by such means variations from standard in

¹ By "accelerated" is meant here : working in grades beyond their *mental* ability.

the numerous activities may be more clearly presented for contrast or comparison. A table similar to that shown on page 123, or a card like the one shown in Figure 1, page 113, will be found helpful. A teacher should be able to give satisfactory explanation of disagreements in data, or she should show that such disagreements represent an unsolved problem that is being studied. Such a practice in the study of every child in the class will go far in making any teacher's work more effective.

A child may not be accomplishing what a teacher feels he should, may be failing when she feels he could pass if he worked, may not be kept busy with present work but the teacher questions extra promotion, may be doing well but could do much more, or may apparently be working hard and not be accomplishing much. "Should I fail him?" "Should I promote him?" "Should I put on pressure?" "Should I avoid pressure, and accept a lower standard of attainment?" "Should I increase the opportunities for enriched work?" These are questions for which the teacher finds help in test data. She cannot rightly judge a child merely by what he does. To be fair she must take into account the mental ability which he has and the effort he must put forth to produce results.

Accomplishment quotient. The *intelligence* quotient shows the relation of age to mental level, or relative brightness. The teacher likewise has need of an *accomplishment* quotient, which will show the relation of accomplishment to ability. Recently attempts have been made to find a practical and scientific expression of a relationship between ability and accomplishment. The search for adequate means of expression of such a relationship has given us such terms as accomplishment quotient, achievement quotient, accomplishment ratio, etc.

It is not our purpose in this book to discuss or to advocate

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any particular method of comparison of ability and accomplishment. Some best method will doubtless be presented soon and will come into common use.¹ Most school systems using report cards have at one time or another tried schemes for marking that would show both quality of work and effort. Twenty-five years ago a report card was in use which had two columns after each subject. The first column was marked "proficiency," the second "effort." The work of the child in each subject was rated in both columns. Teachers have always been desirous of giving the child some favorable recognition in his school report if he has tried hard, even though his work may not have been as perfectly done as that of his more favored brothers who did the assigned tasks with less effort. The development of mental tests and subject tests as instruments for more accurate measurement of ability and accomplishment bring to the teacher a better means of analyzing and expressing a relationship which will indicate both what a child should accomplish according to the mental ability which he possesses and the probable effort he is making as judged by the results he achieves.

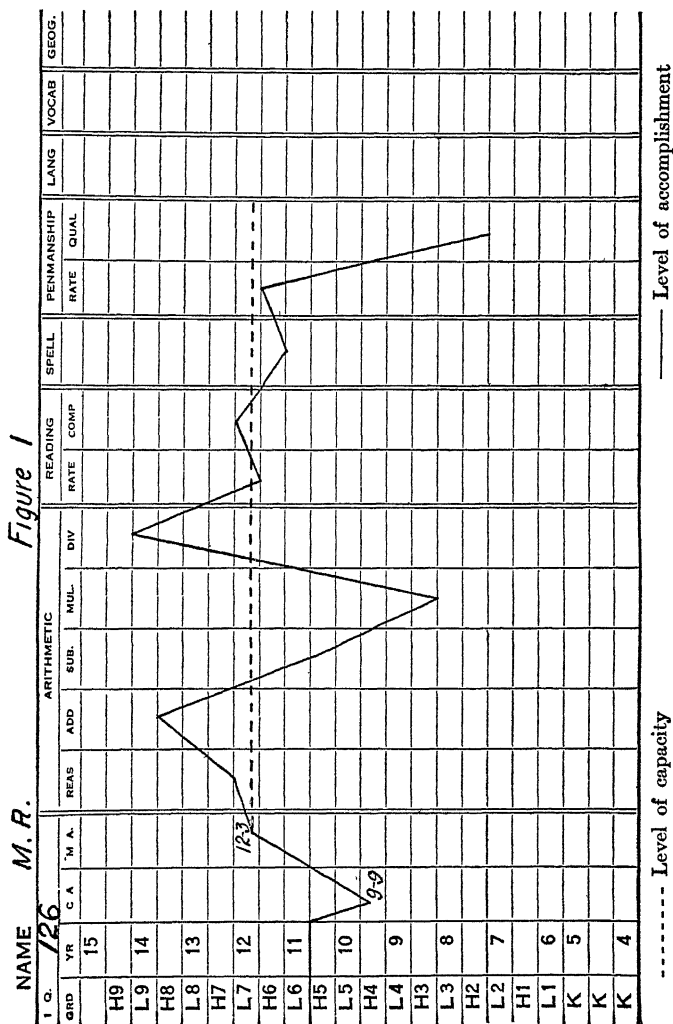
APPLICATION OF MENTAL TESTS TO THE UPPER GRADES

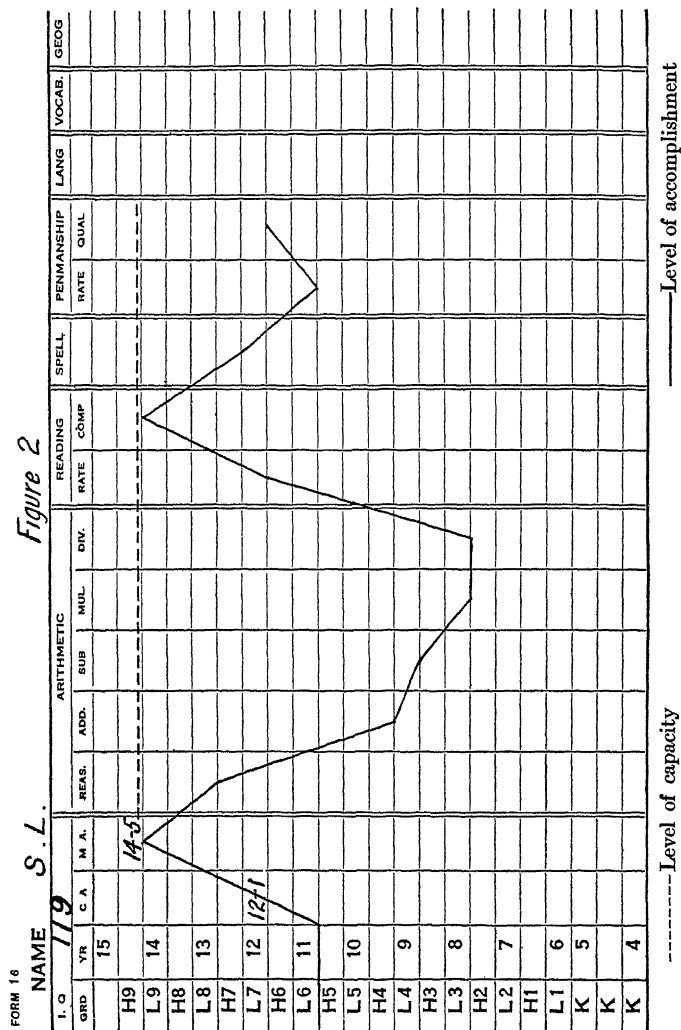
Use of the profile graph. A cumulative record of some kind is essential to the proper understanding of a child's development and needs as he advances in school. The card shown on page 113 ² is one used in the Berkeley schools and illustrates the present effort made by principals and teachers to check accomplishment in its relation to mental ability. In the first column we underline the grade in which the child is working; in the second is printed the age normal to that grade; in the third is recorded the chronological age of the

¹ See end of chapter for references.

² This card was originated by Raymond Franzen, University of California, and was revised for use in the Berkeley schools by A. J. Hamilton.

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child, and in the fourth the mental age earned from an intelligence test. Then follow in succession columns for recording test results in arithmetic (both reasoning and the four fundamental processes), reading, spelling, penmanship, language, vocabulary, and geography. Columns could be added for any desired test.

Figure 1 shows the profile of a boy, M. R., who is in the low-sixth grade. C. A. 9-9; M. A. 12-3; IQ 126. His standard test records in various subjects by grade norms are: in reasoning H-7; in addition L-9; in subtraction L-6; in multiplication H-3; in division H-9; in rate of reading L-7; and in comprehension H-7; in spelling H-6; in rate of penmanship L-7, and in quality H-2. This graph furnishes a striking profile of the boy for the teacher to contemplate. The dotted horizontal line represents his mental age, or level of ability; the solid line indicates his accomplishment. According to this set of data, M. R. by grade location is about one year accelerated for his chronological age and one year retarded for his mental age. He stands very low in multiplication and quality of penmanship, very high in addition and division. Except for multiplication and penmanship his accomplishment in those subjects in which he has been tested seems to match fairly well with his ability and stands far above the norm for the grade in which he is working.

Figure 2 shows the profile of S. L., who is also in the low-sixth grade (same class with M. R.). C. A. 12-1; M. A. 14-5; IQ 119. This boy's accomplishment in the four fundamentals is low. In other tests he stands at or above his grade norm, but in general not up to the level of his ability.

Figure 3 shows the profile of L. N., a girl in the low-fifth grade. C. A. 9-9; M. A. 9-1; IQ 93. She is chronologically approximately at-age for her grade, but in mental age she is nearly one year below grade. Her accomplishment in all subjects except subtraction, multiplication, and division

is about equal to her mental ability, but, with the exception of spelling, it is not equal to the standards of the grade in which she is working. Here is a case illustrating poor grade work, but an accomplishment ratio practically normal.

Any teacher can see from these graphs a number of problems for further study and checking with each of the children concerned. From term to term or from year to year, the profile may be drawn on the same card with ink of a different color and the relative progress in different subjects noted. This card is not presented as a model, but it suggests a procedure which is fundamental in the most effective use of measurement methods by the classroom teacher; namely, that mental tests and accomplishment tests¹ must be used together; that a graphic method of presenting data makes comparisons more striking; that cumulative data remove the tendency for snap judgments to be formed on the basis of a single test, and that they also furnish a basis for judging the steadiness and rate of growth in any one of the factors being measured.

The use of the profile record may be based on the results of either the individual or the group mental test, the only difference being that group test results are somewhat less trustworthy. The judgments based upon them are of a more tentative nature and demand more careful checking as to agreement with other available evidence.

Confusion of group test score with IQ. A common error among teachers is the confusion of the group test score with the IQ. The results of nearly all group mental tests now in use are indicated by a total score of so many points; e.g., 60 on the National Intelligence Test, 92 on the Terman Group Test, or 85 on the Otis Intelligence Test, etc. A score of 60 in one test is not equal to a score of 60 in another. Likewise a score of 60 in any particular test may have a wide variation

¹ For references on accomplishment tests, see end of chapter.

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of meaning for different children. Let us suppose that three children make the same score of 78 in the National Intelligence Test; one is eight years old, another is ten years old, and a third is twelve years old. The score of 78 in this particular test by present norms indicates a mental age of 10 years and 8 months. The three children would have earned the same mental age. Because of the varying chronological ages, however, the first has a group intelligence quotient (GIQ) of 133, the second a GIQ of 107, and the third a GIQ of 89. Such children, although they have the same mental age, usually do not work well together.

A common basis for intelligence ranking. For this reason it is well for a teacher to translate all group test scores into M. A. and GIQ equivalents. Thus we have a basis upon which test scores can be made fairly comparable, whatever test has been given. It should always be kept in mind, however, that the value of results is determined by the degree to which the test being used satisfies the essential requirements of a good group test.

Use of letter ratings. Furthermore, we have found it practical to translate the IQ or the GIQ into a letter rating corresponding to the rating scale used for other data. In Oakland and Berkeley we use the seven-point rating scale and IQ classification as follows:

INTELLIGENCE RANK	MEANING	IQ OR GIQ
A	Very superior	130 and up
B	Superior	115 to 129
C+	Slightly above average	105 to 114
C	Average	95 to 104
C-	Slightly below average	85 to 94
D	Inferior	70 to 84
E	Very inferior	69 and below

Greater simplicity and accuracy will result from such a practice, and any rating made on any test by any teacher may be readily understood by all who use the data.

To illustrate: The eight-year-old child who made a score of 78 on the National Intelligence Test thus earned an M. A. of 10-8, a GIQ of 133, and an intelligence rank of A. Two years later, at ten years of age, he made a score of 72 on the Terman Group Test; this indicates an M. A. of 13-0, a GIQ of 130, and an intelligence rank of A. The next week his score on the Army Alpha Examination was 57, which credited him with an M. A. of 12-9, a GIQ of 127, and an intelligence rank of B. Such data furnish strong evidence of superior intelligence with a ranking of A or B.

Examples of the use of test results with individual pupils. Just how mental test results have functioned in intermediate grades for individual cases may be seen from the following examples:

Rapid progress. J. M. is now finishing the low-fourth grade. His C. A. is 7-8; his M. A. is 10-0; his IQ is 130. Both parents Scotch; father employed in iron works. Mother keeps boarding house; home atmosphere good. One sister has an IQ of 110.

School history:

L-1 grade — one term	Scholarship very superior
H-1 } L-2 } one term	Scholarship very superior
H-2 } L-3 } one term	Scholarship very superior
H-3 } L-4 } one term	Scholarship superior

Teacher's report:

"A splendid little chap; 'all boy.' Has won lots of trophies in foot races. Much interested in athletics and music.

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Wants to be a music teacher. Takes lessons on piano and violin. Finds arithmetic a joy. Does lots of reading. Very popular on playground and with fellows."

Here is a boy two years accelerated at the time of completing the fourth grade; socially popular, physically superior, intellectually a leader in his class, having covered an enriched program in school and out; "all boy." Such cases are comparatively rare, yet might be more frequently duplicated if handled as this one was from the time of entering school.

M. N., a girl, is now finishing the low-seventh grade. C. A. 11-7; M. A. 15-1; IQ 130. The teacher says: "Both parents American. Home conditions excellent. Entered this school in high-fifth grade from state of M. Mental test upon entrance very high. She is charming in behavior and appearance, responsive and vivacious. Her report card showed nothing but 1's. She and her mother (now a widow) both feared acceleration but, upon recommendation of teacher and principal, decided to try the special opportunity class. M. N. covered the complete course of the high-fifth grade in 48 days; covered the low-sixth and high-sixth grades in 43 days, and is now finishing the low-seventh in 82 days. All of her grades have been 1's. Her work is almost perfect."

This girl has saved a year of time in her school progress because the mental test gave the teacher and principal confidence to urge that she be permitted to use her superior ability by approaching work just a little more nearly commensurate with her mental level. (Note that she is still in the low-seventh grade, while her M. A. of 15-1 is normal to the high-ninth grade.)

Apparent ability not used. L. J. is now finishing the high-second grade. C. A. 7-8; M. A. 10-1; IQ 132. Father a brakeman, mother a telephone operator in hotel.

School history is as follows :

Kgtn.	— two terms	Scholarship very superior
L-1 grade	— one term	Scholarship good
H-1 grade	— one term	Scholarship poor
L-2 grade	— one term	Scholarship good

The teacher says : “ He has always been a nuisance in school. Refuses to learn according to accepted methods and seems to be bored to distraction with the school system. Inattentive and lazy. He has been given the mental test in kindergarten and again in the high-first grade ; IQ almost identical in the two tests. Cannot find any work which appeals to his ability. Future development will be studied closely.”

Here is a case which for three years has resisted all efforts of teachers to get school work to match the high mental ability apparent by test. His teachers feel that his intelligence is blocked from effective operation by temperament and lack of mental effort.

C. D. is finishing the high-sixth grade. C. A. 11-1 ; M. A. 14-7 ; IQ 132. Both parents American. The teacher says : “ Father a laborer on railroad ; was injured in an accident and left a hopeless cripple ; is embittered toward life. Poverty in home. C. has spent a full term in each grade from the first to the sixth with passing marks. He always wears an expression of ‘ I won’t work ’ ; usually does well in written lessons but will scarcely make an oral recitation. Says he doesn’t like any school work or any work outside. He reads a great deal.”

This boy seems to have superior intelligence, but never does consistently superior work. At times he apparently forgets himself and shows brilliancy, then quickly drops back to indifference and sullenness. His teachers all agree that he seems to have ability which he will not use. He is rather troublesome and “ Bolshevistic.” Is this a temperamental

condition? Is it due to embittered attitude toward life found in the home? Can the teacher reach the problem? Thus far it has not been reached, but hope should not be abandoned. Perhaps the variety exposure to different subjects next year in the junior high school will release some interest which will lead him to more effective use of his powers.

The over-age and dull. J. C.; C. A. 14-3; M. A. 10-1; IQ 71. Teacher's report: "J. has spent two years in the sixth grade; he works hard but cannot do the standard work according to the requirements of the course of study. He is so slow. He is a good-hearted boy and a good citizen on the playground; has a splendid sense of justice and right. I do not feel that it will do any good for him to stay in my room and repeat the sixth grade, but I feel equally sure that he cannot do seventh-grade work. Shall I promote him? Shall I be criticized by those who have him next year if I do?"

This is typical of what faces hundreds of teachers in America at the close of each term. It is a serious problem and one most difficult to solve. Some common educational policy should be developed to guide the teacher in such cases. The problem will be discussed in greater detail in Chapter VIII, dealing with the inferior child.

Mental tests used in classification. In addition to the study of individual conditions just discussed, the mental test results are used to assist in classification of pupils.

It must be remembered, however, that not mental age alone nor IQ nor any other single factor can be used successfully in the classification of children into effective working groups. Mental age may well be used as the first basis, but further selection must be made with reference to IQ. Bright children and dull children do not work at the same pace and will not long continue to work well together at the same tasks. Past accomplishment must also be taken into consideration, as well as health, physical development, and industry.

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For example, a principal has 76 high-third-grade pupils and he decides to classify them into a "stronger" group and a "weaker" group.¹ First, he asks the two teachers who have taught these children and are most familiar with their accomplishment to mark, independently, an "S" before the names recommended for the stronger group, "W" before those recommended for the weaker group, and a "?" for those that are doubtful. They likewise rate other traits called for in the table below. A tabulation of data is then made containing all the available information concerning each child. The table may be arranged as follows:

CHILD'S NAME	AGE	M. A.	IQ	INTELLIGENCE RANK ²	TEACHER'S EST. OF SCHOOL WORK ²	TEACHER'S EST. OF INTELLIGENCE ²	TEACHER'S RATING ON INDUSTRY ²	HEALTH RATING ²	TEACHER'S RECOMMENDATION (S, W, or ?)	REMARKS	FINAL PLACEMENT (S or W)
A. W.	8-6	8-9	103	C	C-	C-	C	C+	?		W?
M. P.	8-0	10-9	134	A	B	B	C	B	S		S
G. C.	9-8	8-1	84	D	E	C-	D	C	W		W

By "Intelligence Rank" is meant the placement of the child's IQ on the 7-point scale according to the table on page 118. By "Teacher's Estimate of Intelligence" is meant the rating of the child's ability as compared with a normal child of the same age.

¹ In some schools classification into two groups, as here suggested, is most practicable; in others three divisions (i.e., strong, average, and weak) may be organized. The number of divisions will depend upon the size of the school and other local conditions.

² Use 7-point scale for rating in these columns.

With the complete tabulation before them, the principal and all teachers concerned, meeting in conference, make selection of the children for the two sections. To the stronger section in such a division are usually assigned ten or twelve more pupils than to the weaker section. In this way the teachers feel that the load has been equalized.

USE OF TEACHER'S RATINGS

Value of the teacher's estimates. It is our custom, when classifying into ability groups, to ask teachers to make estimates on such factors as intelligence and accomplishment before they are given the test results. The reasons which justify such procedure are: (1) the possible inaccuracy of test results; (2) the training thereby given teachers. Personal and impersonal data separately produced serve as a desirable check one against the other. The teacher is encouraged to make deeper study of variations in data and learns to guard herself against making snap judgments.

Those most familiar with tests know that, while they are the best single criterion available, they are still very imperfect. The tests for measuring human traits are of course far less accurate than those for measuring distance, weight, or time. The human traits which they measure are also more subject to external influences which produce apparent fluctuations.

The teacher who rates a child, knowing that her judgment will be checked against an impersonal measurement, will usually do her best at careful thinking. Thinking is hard work, but it has a very refining effect on opinions and judgments. To make an accurate rating on a child's intelligence usually compels the teacher to consider the age of the child more carefully than she has ever done before. Similar care will be required if she rates accomplishment in subjects. If there is variation between her rating and a test, and if the teacher is sincere in her desire to know the reason for such

variation, then deeper study of the cause is sure to follow. Thus the way is pointed for refinement both of tests and of teacher's ratings. Evidence points to the conclusion that improvement is possible in both. Giving test results to a teacher and asking her to base her judgments on them and on other facts known to her places before her an unfair temptation to let the test do the work and robs her of a wonderful opportunity for developing that characteristic of inestimable value to any teacher, the ability to judge the traits of her pupils.

Measures of teaching success. In the past a teacher's success has been judged by whether or not a pupil has accomplished standard requirements set for the grade. Mental testing has been of great service in revealing how inadequate and unfair such a measure really is. Before we can be fair in judging even the instructional phase of success in teaching, we must consider mental ability in relation to accomplishment. Nor should we stop with a consideration of the purely instructional aspects of teaching; a teacher's work cannot be judged exclusively by the success she has in bringing her children to that degree of mastery of subject matter which accords with their abilities. Education is more than the mastery of facts, but since it is the relation of mental tests to classroom teaching which is our thesis in this volume, we must forego the treatment of other important factors which go to make up teaching success. Nevertheless, the teacher should remember that, while slavish dependence upon tests makes for mechanical, lifeless teaching, their proper use leads to a better understanding of the child, which must ever remain a basic factor in successful teaching.

SUMMARY

1. Past school practices in gradation and promotion have tended to produce wider and wider ranges in the mental

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ability of pupils with each succeeding grade of the elementary school.

2. There is a large number of pupils who drop out of school from that group representing the lower range of intelligence. This number increases each year after the fifth grade has been reached.

3. A teacher cannot rightly judge a child merely by what he does. She must take into account his ability and the effort he must put forth to produce results. Hence a method is necessary for rating accomplishment in terms of ability to accomplish. The search for such a method has resulted in the development and application of the terms "accomplishment ratio," "accomplishment quotient," etc. These relationships can be expressed only through a combined use of mental tests and tests of accomplishment.

4. A group test score should not be confused with an intelligence quotient. Any score, however, may be translated into a mental age equivalent, and this in turn into an intelligence quotient. Thus all test scores can be made more nearly comparable.

5. Mental test results are used for two purposes: (a) for the study of individual cases; (b) for the classification of pupils into ability groups.

6. By having teachers check their own estimates of pupil ability and pupil accomplishment by the use of standard test results, the teacher's judgment is refined and she is stimulated to make careful study of apparently contradictory data.

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CHAPTER EIGHT

MENTAL TESTS AND THE INFERIOR CHILD¹

PROBLEMS ARISING FROM INFERIOR ABILITY

What is "inferior" ability? It is natural that the child of inferior ability comes into the limelight of attention before every teacher and in every school. In this volume we use the terms "ability" and "capacity" to indicate the power to do the type of work required in the elementary schools — to learn to read and to work with numbers, to do the reasoning and thinking required by the ordinary course of study. There are those who point to the business or financial success of some person who never passed beyond the fourth or fifth grade, or of one who cannot read or write, in order to prove that intelligence is of various kinds. There are doubtless many factors that make for success or failure in the business world. We are unable to say to what extent special ability may be necessary in commercial pursuits or in specific trades or vocations; we do know, however, that general intelligence as measured by a mental test has a high correlation with success in school, and this is the factor which most vitally concerns the teacher.

Teacher's attention demanded by inferior children. The public school is expected to manage the children who are intrusted to it, in such a way that each pupil will get the maximum benefit from the time spent. From some pupils it is possible to get exceptionally good work, from others satisfactory work, and from some we can get very little. As soon as a teacher begins to check on the quality of work done in her assignments, the individuals attracting attention are those who cannot do the work. If the subject is reading,

¹ Written with the assistance of Miss Henrietta A. Johnson, Assistant Director of the Bureau of Research and Guidance, Oakland.

those who cannot call the words orally or who cannot understand the meaning are immediately prominent. In spelling, it is those who miss words; in arithmetic, those who miss problems or do not know the tables, etc. It is much easier for the teacher to detect those who cannot do the assigned work than it is to discover those who could do more than is assigned. Nor is it customary for children to want to show the teacher that they are able to do much more than the assignment requires. The teacher feels a responsibility for getting her children to pass the work of the grade in the customary time. Her problems quickly center about those who seem unable to do their work. On these she spends the larger part of her teaching time, trying to "pull them up" to the standards set for accomplishment in that grade.

Frequency of failure. It is a serious thing to fail to promote a child when his fellows move ahead, and nearly all teachers feel the weight of such responsibility. Yet failure is very common. If every child who fails of promotion were coated in black, we would have at least one out of every four thus labeled before the first grade had been finished. From 5 per cent to 10 per cent of failures are added for each grade as we go up, until, by the time the sixth grade has been completed, more than one half of our school children would thus have earned a coat of black, many of them several coats. It is significant that one failure seems to call for another at frequent intervals.

Failure of pupils in school is so common that it has been accepted by people in general with little realization of the price that society must pay. First, it costs more than can be estimated in the life interests, self-respect, and attitude toward work of the children who fail. Second, it costs much for teachers' service in re-teaching. There are more than 20 million children enrolled in the elementary schools of the United States. About 2 millions, or 10 per cent of these,

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fail each year. The annual per pupil cost of education in the elementary grades is at least 40 dollars. The annual cost of re-teaching those who fail each year in the United States, therefore, is at least 80 million dollars. Common sense demands that we discover, and, if possible, remove the cause or causes of a condition so prevalent and so serious as this is.

Causes of failure. There are many causes, or contributing causes, of failure in school, but the one most commonly given by teachers is inferior mentality. Of the 1776 failures reported in one semester in the elementary grades of the Oakland schools, 48 per cent were attributed by the teachers to inferior mentality, 28 per cent to irregular attendance, and 11 per cent to ill health. The remaining 13 per cent were attributed to numerous administrative and environmental difficulties, such as overcrowded classes, substitute teachers, etc. The first three causes are closely related. Inferior mentality is frequently the cause of irregular attendance; it is also probable that mental inferiority tends to be associated with inferior health. It is safe to say that more than three fourths of the failures in the elementary school are due wholly or in part to the fact that children are asked to do work beyond their mental ability.

Impossibility of removing the chief cause of failure. By checking with mental test results, as indicated in Chapter IV, we have found a very high agreement in any grade of the elementary school or of the high school between inferior work and low test result. Since inferior mentality is largely responsible for school failure, and since all studies show that the IQ remains relatively constant, we must conclude that the chief cause of failure in the elementary schools cannot be removed under present curriculum requirements. The average failure is not due to poor teaching, to poor health, or to poor attendance, but to lack of ability.

It is manifestly unfair to assign tasks that are impossible. The child who day after day faces requirements too heavy for his honest effort is being steadily forced into discouragement and dissatisfaction. Habits of deceit and trickery often result, for by dishonest methods he seeks to earn the praise for success which he so much desires but seldom attains. Moreover, the child who tries again and again work which is beyond his ability is sure to suffer loss of self-confidence and through continued failure is likely to develop a spirit of hatred for the school and for the law that requires him to attend it. Thus is given, unconsciously on the part of the teacher, a positive training for undesirable citizenship.

Necessity for curriculum adjustment. What should be done about it? There is only one way in which the public school can adequately meet the problem, and that is through a differentiation of courses of study and standards of attainment. The person who has lost self-confidence has lost the power to use effectively even that ability which he has. Let us, then, give the encouragement that comes from success in doing tasks commensurate with ability. Instead of thinking so much about fitting a child into an established curriculum, we must begin to think more about modifying the curriculum to fit the needs of the child. Such a policy leads inevitably to methods of classification which will meet the varying capacities of children. Whether for the city, or the town, or the rural school, the principle of adjustment remains the same; every school, wherever situated, faces the same problem and must employ the same general method of solution.

The general opinion of educators has been that the work of the elementary school for at least six grades, and possibly for eight, is fundamental and should be required of all pupils alike. It is our belief that this conception must change. As a result of the compulsory attendance laws, we must now

cussing the placement of such a child is that "he will be a misfit in the next class." Let us ask if he will be less of a misfit if he is failed and required to repeat his grade? He may, perchance, through repetition, be able to do the assigned tasks in the textbook a little better, but there are many other factors to be considered in determining whether or not he is a "misfit." Any child is a misfit in school if he is not where he ought to be, considering the sum total of values which the school has to offer to him. In some school systems administrative machinery can be developed which will help to serve misfit pupils by segregation into special groups. The greater number of such cases will, however, regardless of administrative machinery, remain as problems for the regular class teacher. There is no highway of classification that will lead a teacher out of the necessity of adapting her instruction to the individual differences of pupils assigned to her room. Proper administrative machinery will help, but in the final analysis education must remain largely the problem of the teacher and the individual child.

Discovering pupils of inferior mentality. One of the first principles of good teaching requires the discovery of what a child knows. Next, the teacher must find how the child can adjust himself to the new problems which he encounters. She must discover how well he learns. The mental test is a tool designed specifically to help in the study of a child's power to learn. A teacher should use all the science of pedagogy she possesses to get the child to learn. If she cannot succeed, she should seek diligently for the cause. Such seeking involves the analysis of the child's reactions to her teaching, the analysis of his case history, and the analysis of the results of mental tests.

This procedure may be followed in a school thus: the children who come from the kindergarten to the first grade are immediately classified into the superior group, the aver-

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age group, and the inferior group. Those who come to the receiving class without kindergarten training are classified first on a language basis. Those who understand little or no English must be taught English; then placement can be made according to ability. Those who speak English are given a mental test. This, with whatever history is available, is made the basis of tentative classification, and assignment is made to one of the groups mentioned above. Constant observation and checking continue during the term, with a view to possible readjustment of any child who has been wrongly classified.

CLASSIFICATION OF INFERIOR CHILDREN

Special "limited" classes. On page 49 we have presented data showing the inferior work of children in the first grade who are mentally below six years. Early in the term, work should be adjusted so that these children will not be required to attempt the regular first-grade course when it is clear that they cannot be expected to pass. They should take that which they can do if allowed a slower rate, or they should be given different work. Where the school is large enough, these children may be placed in "limited" classes.¹ In smaller schools they may be handled as groups or as individuals. The treatment of limited-class pupils involves two alternatives: (1) that they move up through the grades at a slower rate of progress but fulfilling standard requirements; (2) that, after attaining reasonable accomplishment in reading in the first and second grades, they progress regularly, or approximately so, through the grades, but taking only such portions of the curriculum as seem most essential

¹ Various names are used to designate such classes. The terms "opportunity" classes, "atypical" classes, "adjustment" classes, "development" classes, "limited" classes, etc., are all evidences of a common effort to avoid the stigma so prone to be attached to the special-class child by other children and the general public. In general, these names are an effort at camouflage.

to their needs and possibilities. While it may still be an open question which of these policies is better, we favor the latter. How much of the standard curriculum is necessary life equipment to the child of limited intelligence? Why should such a child be forced to do the traditional things of the course of study if they do not meet his social needs or develop his habits of mental application?

With this point of view in mind, the limited-class pupils should be given work of kindergarten or introductory first-grade nature until they reach the mental age (seldom below six years) which enables them to attack successfully the reading, language, and number work of the first grade. It may take two years for them to learn to read even approximately up to the first-grade standard. After they learn to read, they should pass on through the grades as limited-class pupils, doing the work each year or in each grade which seems most essential to their progress. The problems on which they work can usually be closely related to the problems of the regular grade, but should be more simply arranged in a special type of text. To have seriously over-age dull pupils use a regular textbook which is easy enough to suit their mental level introduces a difficulty similar to that found by Americanization teachers who try to use primary books to teach adult foreigners. There is need of a textbook especially arranged for limited classes, suited to their greater maturity in social and physical life, yet presenting the content in the simple form required by their limited intelligence.

In Oakland our limited classes are composed of pupils from one to three years over-age for the grade; the median IQ of the class is usually in the 80's. Table 27 shows the median chronological age and IQ for each of the limited classes in one of our schools. Note the over-ageness existing in each grade above the first, and the mental inferiority as indicated by the IQ.

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TABLE 27
MEDIAN CHRONOLOGICAL AGE AND IQ OF LIMITED CLASSES IN
AN OAKLAND SCHOOL

GRADE	MEDIAN C. A.	MEDIAN IQ
1	6-4	78
2	9-0	83
3	10-6	81
4 } 5 } 6 }	12-0	78
	13-2	84

Read the table thus: In the limited first grade the median C. A. is 6-4, and the median IQ 78; in the limited second grade the median C. A. is 9-0, and the median IQ 83; etc.

Where it is impossible to organize a separate limited class for each grade, two grades can be combined, as are grades four and five shown in the above table. In any case the enrollment of these classes is kept considerably below the standard for normal groups. The segregation of the slower pupils makes it possible to increase the size of the regular class, thus necessitating no additional teaching force. Thus segregated, the pupils of both divisions have been found to work better, to behave better, and to accomplish more.

Special limited classes are planned for pupils from the first grade throughout their school course. They pass from the limited first to the limited second to the limited third, etc., from year to year, progressing steadily, but one or more years over-age. They progress, not because they have covered standard first, second, or third grade work, but because they ought to pass up through the grades, getting as much as they can as they advance, and finally reaching some of the features of upper-grade work which are most essential in preparing this type of pupil for an early introduction into industrial life and citizenship. Our problem is to give them the best

education which the schools can give up to the age of sixteen. It is not the problem of what grade they shall work in or finish, but what education we can give which is best fitted to their needs.

Illustration of a limited first-grade class. The following table shows C. A., M. A., and IQ of a few children segregated for a limited first grade:

PUPIL	C. A.	M. A.	IQ
A. L.	7-4	4-0	55
M. W.	6-10	5-6	80
G. P.	6-1	4-8	77
C. N.	6-8	5-0	75
G. S.	6-5	4-4	68
L. Y.	6-7	4-4	66
T. Z.	7-1	5-6	78
Etc.			

This class was organized with 27 pupils. An experienced teacher of kindergarten and first grade was placed in charge, and told to give the best education she could. Ten of the pupils tested with an IQ of 70 or below; 17 with an IQ of 71 to 87 inclusive. The median IQ was 76. Fourteen were in the 4-year M. A. group; 13 in the 5-year M. A. group. The median M. A. was 5-1. The median C. A. was 6-7. These children were from the poorer section of the city, with home and neighborhood environment very undesirable. They remained for two years with the same teacher. At the end of that time they were tested in oral reading, and were found to be about average for the first grade in speed and accuracy of pronunciation, but below standard first grade in comprehension. At the end of three and a half years, 18 of the original 27 were still in the same school. Two were finishing the limited second grade, and 12 were finishing

the limited third grade; hence these 14 were one or two years retarded, even though working in a limited group. Four had been placed in a regular low-third grade — one and a half years retarded in progress. Normal progress during that time would have placed all in the high-fourth grade.

Curriculum of limited classes. The greatest obstacle to the progress of these children in the limited first grade comes naturally from inability to learn to read well enough to be successful in any kind of work that involves reading. Usually during their total school career they can be taught a little reading, writing, spelling, and number work, — as much as they will be called upon to use in the social and civic life of which they will become a part. However, it is a waste of time and effort to try to teach these things at first. They can be mastered much more easily and with more reasonable expenditure of time and effort at a later period. Probably the most important instruction the school can give to limited-class children comes through activities that develop the habits of square dealing and fair play with their fellows. They can learn to be industrious and helpful; they can learn something of health, hygiene, and citizenship. Music, also, furnishes an approach that has been found very successful. It gives opportunity for both individual and group activity. Many learn for the first time to take an effective part in community life through chorus singing or through organized play.

In the poorer sections of the city one of the “striking” characteristics to be overcome in the children of limited capacity when they first come to school is the tendency to strike and to avoid being struck. They are timid, fearful, always on the defensive. They will dodge or shrink from the teacher at almost every physical move she makes. They are evidently used to cuffs and blows and are constantly on guard. These are the future citizens of discontent and antagonism, unless this characteristic can be broken and better

habits of living and thinking put in its place. A better social attitude will seldom develop in an environment of failure; therefore from the very beginning there is great need of work which will permit the inspiration that comes from a reasonable share of success.

Classification in high school. The policy of classification does not stop with the elementary school. The very fact that these limited-class pupils are carried on through the grades means that the junior high school and the senior high school must receive a large number of children who formerly left school before completing the elementary grades. These pupils are clearly not capable of carrying the standard course as prescribed in our regular high schools. The high school, therefore, must make an important decision; it must either furnish courses of study adapted to the needs of these children, providing proper classification for them, or it must give them a trial at work which they cannot do, fail them, and then pass them out.

We have said that the curriculum for limited pupils in the elementary grades should be made similar to that of the regular grades, but simpler. In the high school, however, curricula should be radically changed to fit the needs of limited-class pupils. Such pupils do not need merely a diluted form of algebra or Spanish or Latin, nor will the need be met by a system of electives or by decreasing the number of courses a pupil may take. The limited pupil demands a different course of study. If he cannot comprehend the regular class work, he should be given something else; what this should be can be determined only by study of his mental ability, his needs, his environment, and his vocational opportunities. As a matter of fact, our high schools and junior high schools are rapidly adjusting themselves to this new problem by classifying pupils according to ability, and by reorganizing the content of some of the courses.

During the past three years 245 pupils in the Berkeley schools (162 boys and 83 girls) have been taken out of the elementary grades three, four, five, and six, and have been placed in the Burbank Junior High School because they were over thirteen years of age and could not do the work of the elementary grades. They were mentally inferior, and according to the judgment of their teachers and principals were unable to profit by the education offered in the elementary school. They were transferred to the junior high school into a social group of similar age. In this school any pupil who shows a special ability is allowed to use it extensively. Through this channel he is gradually led into other school activities in which he can do some successful work once his interest is aroused. If no special ability is evident, the major part of the time is spent in the limited class. However, each pupil is a citizen of the school, and as such participates in the physical training, athletics, music, general assemblies, and general school life with those with whom he will later mingle in life at large. Of the 245 limited pupils promoted to this junior high school, only four boys and one girl (in three years' time) have failed to make satisfactory school citizens. These have been sent to some school of correction. Nearly all have made good in one or more forms of regular school work, and some have been shifted entirely into regular class work. The general attitude of this group has changed from that of discontent to a willingness on the part of each to try to take his place in the life of the community. A large majority have continued in school even after the compulsory age of sixteen. The child who is held in the fourth, fifth, or sixth grade until sixteen seldom remains a day beyond that which gives him his legal freedom from school.

Special "atypical" classes. We have been describing work for special limited classes involving from 15 per cent to 25 per cent of the average school population. However,

the most apparent need — please note that we say *most apparent need*, not the greatest — in almost every schoolroom is that which concerns the proper treatment of the defective and the borderline defective. These include from 1 per cent to 3 per cent of the average school population. For such pupils many cities have organized special classes, in Oakland called “atypical” classes, each limited to an enrollment of 15 or 16 pupils. The instruction is largely individual. These classes are for the mentally inferior, not for those who are incorrigible or for those who are below grade because of absence, physical condition, or any other reason except inferior mentality. No child should be placed in a special atypical class until (1) actual trial proves that he is unable to profit by instruction in a regular class, and (2) the mental test shows inferior mentality. Neither of these alone is sufficient basis for assignment.

Instruction in “atypical” classes. The purpose of the special-class instruction for these pupils is:

(1) To give each pupil as much of the standard curriculum as he can take with reasonable effort.

(2) To give more work of manual nature than he can be given in regular classes.

(3) To discover and to train any special ability the child may show which would enable him to become a useful member of society, partially or wholly self-supporting.

(4) To instill proper attitudes toward problems of citizenship and toward life in general.

It is not the purpose of the special atypical class to coach a child to enter the regular grade again, although if a child shows at any time ability to do work with a regular class in a manner that is at all satisfactory, he should of course be transferred to such a class.

No definite course of study is fixed. All are taught reading, writing, language, and number work in so far as their capaci-

ties permit without excessive expenditure of time. Approximately half the time is spent in some form of manual work. The following are the types of work commonly found: wood-work, toy making, rug making, brush making, basketry, sewing, embroidery, knitting, lace making, millinery, chair caning, cobbling, clay modeling, pottery work, making of crêpe paper flowers and favors, practical lessons in cooking and care of home (where equipment permits).

This type of special class has proved decidedly successful, as well as absolutely necessary for the handling of certain kinds of problem cases. The normal class and its teacher are relieved of a drag; the pupil, doing work adjusted to his particular needs under the direction of a specially trained teacher, is more contented and has a better chance of developing whatever ability he may have.

Motor vs. mental powers. Children of inferior intelligence are usually less defective in motor than in intellectual abilities. If they are to be made self-supporting, it must be by training in types of work not requiring difficult mental adjustments. Their ability to reason, to make quick, accurate decisions or to adjust to new conditions or demands is very limited. The things they can learn best are tasks involving only simple operations which are done over and over again in the same mechanical way. Hence the instruction of such children should include a small amount of the academic work and a large amount of the manual. Out of this fact unfortunately has grown a popular misconception that the mental defective is likely to be capable in manual work even to the extent of possessing unusual skill. "Clumsy brain but skillful hand" is almost an adage. The reverse, "a keen mind and clumsy hand," is also rather widely accepted. There is no basis of fact for either of these beliefs. It is true, however, that if the retarded child does take on training that approaches the normal in

any type of work, it is more likely to be along manual than mental lines.

The industrial work in our shops, home making and manual training classes, manual arts, mechanical drawing, and even typing have all suffered because of the common conception in the minds of pupils, parents, and teachers that any student who does poorly or fails in the so-called academic work will probably do well in these classes. Vocational high schools have had a hard time to prevent the conception that they are for the misfits or the dullards who could not succeed in the regular high school. Experience clearly shows that individual differences in learning are just as great in these vocational classes as in other classes. The vocational school needs excellent minds for development into expert workmen and mechanics. By long and laborious work it may develop in the mentally defective or in the dull a manual skill that will assist in making a livelihood. But the fact must be faced that differences in learning apply to the manual as well as to the strictly mental processes.

Mental level of atypical class children. The following data will illustrate some of the conditions as to C. A., M. A., and IQ of children in sixteen special atypical classes in Oakland, each class enrolling about 16 pupils. The distribution of *chronological ages* is as follows:

C. A. in years . . .	7	8	9	10	11	12	13	14	15	16	17	TOTAL
No. of children . . .	6	7	13	26	28	29	43	59	36	8	3	258
Per cent in each year group	2	3	5	10	11	11	17	23	14	3	1	100

Eighty per cent of the group are over 10 years of age, and 41 per cent are 14 years or above — that is, of high school age. The median C. A. is 13-6. This does not mean that the special atypical-class children do not exist in the younger

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ages. It shows merely that the problems of handling them become greater as they grow older and fail to progress. Moreover, several years are usually spent in trying to teach them in regular grades before all persons concerned in the decision are ready to agree that the mental ability is inferior.

The distribution of *mental ages* for these same 258 children is as follows:

M. A. in years	4	5	6	7	8	9	10	11	12	TOTAL
No. of children	3	7	22	45	50	44	56	20	11	258
Per cent in each year group .	1	3	9	17	19	17	22	8	4	100

Eighty-eight per cent of these children are mentally under 11 years, or below that which is normal to the sixth-grade child. Seventy-five per cent are found in mental age groups 7 to 10 inclusive. Considering M. A. alone, then, the majority of these children have the ability to learn comparable to that found in grades two to five inclusive. The median M. A. is 8-7. Since the median C. A. is 13-6, the average mental retardation is between 4 and 5 years. When measured by standard tests of accomplishment these children seldom measure up even to the norms for their mental ages. Fifty per cent made only second-grade standing in tests in reading and arithmetic, while 50 per cent made only third-grade standing in writing and spelling. An extensive study of the results of tests in reading, writing, arithmetic, and spelling in special atypical classes makes it clear that "a large per cent of our special-class children are not profiting by instruction given in the three R's."¹

The distribution of the 258 children according to *intelligence quotient* is as follows:

¹ Maud A. Merrill, "The Relation of Intelligence to the Ability in the 'Three R's' in the Case of Retarded Children." *Pedagogical Seminary*, October, 1921.

IQ	40-49	50-59	60-69	70-79	80-89	90-99	TOTAL
No. of children . .	10	33	92	97	24	2	258
Per cent in each IQ group	4	13	36	37	9	1	100

Ninety per cent of the group fall below 80 IQ; 53 per cent below 70 IQ; the median IQ is 69.

To summarize, this group of 258 special atypical-class pupils has a median C. A. of 13-6, a median M. A. of 8-7, and a median IQ of 69. These figures are not presented as necessarily typical of special classes in general. They represent the situation in only one city. In this school system slightly more than 1 per cent of the elementary school children are enrolled in special atypical classes, and almost 10 per cent are enrolled in special limited classes. There are not enough special atypical classes to accommodate all who ought to be there, and as a result the limited classes accommodate many who rightly belong in the atypical groups. Likewise the limited classes are insufficient in number; hence many children who ought to be in such groups are still enrolled in regular classes. Both these types of special classes justify themselves from two general viewpoints. First, they give their pupils a more useful type of education than the regular classes could give them. Second, they relieve the teachers of the regular classes of the most difficult problems for classroom instruction, with the result that an opportunity is furnished for better work by all other pupils.

The "opportunity" class. One other group of pupils should probably be discussed in this chapter, although technically they are not included under "the mentally inferior." We refer to those pupils who because of absence, sickness, indifference, moving about, or some other reason have dropped behind the grade in which they would naturally

belong by ability. For these there should be "opportunity" classes. The purpose of the opportunity class is to give individual attention to the pupil, in order that he may quickly make up the work which he has lost or which is necessary to permit him to reënter a regular grade normal to his ability.¹ This is, therefore, an adjustment work which prevents the marking of time by the child who is working below his mental level.

To complete our scheme of organization, we may mention : (1) regular classes, which involve no need of discussion here ; (2) classes for the mentally superior, to be discussed in the next chapter. The reader should keep clearly in mind that we are discussing classification according to individual abilities. Discipline, incorrigibility, truancy, etc., should never be used as a basis for assignment to any of these groups. Special classes should not be considered the dumping ground for every type of problem case which proves difficult for principal or teacher to handle.

PROBLEMS OF CLASSIFICATION

A number of questions involving the treatment of the inferior pupil are so frequently asked that they merit some consideration in this chapter.

1. **What's the use?** We frequently meet a teacher with the attitude of "What's the use of giving a mental test? We have no special class and no place to send the misfits when we find them." Let that teacher remember that the purpose of the mental test is not merely to help her get rid of one who is a problem. Some teacher must continue to have charge of the child, and, until provision is made in the school for special handling of the misfits, she herself is likely to be that one. However, she should also remember that the mental

¹ The opportunity classes also provide for certain children of superior capacity, as discussed in Chapter IX.

test will give her a better understanding of the child and thus help her to deal with him more wisely; it is of vital use to her in the study of every child under her direction, whether the child appears to be a misfit or not.

2. Does the inferior child lose interest when segregated? Does the inferior child lose interest and become still more retarded by being placed in a group of his own kind? Does he need the inspiration of the superior? Our experience with a large number of classes and teachers from kindergarten to high school, inclusive, makes us answer unhesitatingly that such children do better school work and have greater interest when segregated into classes of their own kind. Competition with equals or near-equals tends to produce greater interest and greater effort. On the other hand, we have known cases in which the accidental introduction of one or two bright pupils into a limited class has changed almost completely the spirit of most of the members of the group from one of real interest to one of reserve and unwillingness to try.

3. Should the parents and pupils know? Should the special-class pupil and his parents know that his work is inferior to that of regular standard? The child who goes up through the grades in limited classes and who thinks that he is doing standard work is likely to meet a sad experience if perchance he drops into some regular class in high school. The disillusionment that is bound to come will bring unnecessary discouragement and an undesirable attitude toward himself and toward the world. The process of disillusionment invariably makes friction between the parents and the school. Actual struggle with several problems of this kind makes it appear advisable that at some time during the child's development both the child and the parents should be led to realize that the work which is being done is not of standard grade. This does not mean that any child should be made to think of himself as an inferior, but that he *should* think of

the place in life which he can fill successfully. The whole scheme of classification should be based upon an attitude of merit, not of demerit. Both parents and child should be led to feel happy that the pupil has opportunity to work up to capacity. They should be led to understand that the truest measure of success will come to the child in social and industrial life when he has found that work which is within his mental capacity but which calls forth all the ability which he possesses. That person is wise who directs his efforts and ambitions to the type of life activities in which he may have reasonable hope of success. "Hitch your wagon to a star" is good advice, but a star of the wrong magnitude will produce on the one hand indolence, on the other hand failure.

The teacher or principal who seeks to develop the right kind of understanding with parents and pupil will have need of all the tact he can command. We warn him never to use the mental test as a discussion point in dealing with parents or child regarding the problem. By so doing, his whole scheme of mental testing and special-class organization may be subjected to an undesirable and unnecessary attack by the community. Sentence imposed by mental test will make enemies of mental testing. The general school behavior and progress of the child furnish the safest basis for discussing the classification and the possibilities of a pupil.

4. Should separate schools be provided? Should special classes be grouped into a centralized school, or should they be retained as a part of the regular school? The main arguments for centralization are that, with a larger school plant and with equipment especially planned for such pupils, it is easier to provide for special classification and for variety of instruction. On the other hand, there are two strong arguments against centralization: (1) the stigma which is almost sure to be attached to the school and to the pupils who attend it; (2) the false standards of work, of conduct, and of

life ambition that grow up among pupils so segregated. The first of these leads to difficulty in dealing with the parents¹ whose children are in greatest need of such a school. As to the second, children who are thus isolated from natural contact in play and social life with the general mass of children of their own age, tend to become more stratified and to set up standards of work and conduct not well suited to the requirements of the life into which they must fit after leaving school. These pupils will not be wards of institutions and will not be living under strict supervision. They will compete among their fellows in the world at large. Although we can see certain advantages in both methods of dealing with this question, we favor, except for institutional cases, a natural distribution throughout the city of special-class rooms as integral parts of the regular schools and closely related to all the school activities of ordinary pupils. This in no way interferes with the carrying out of any policy of classroom instruction that may be deemed best.

5. Should the limited-class pupil be allowed to graduate from the eighth grade? Our answer is "Yes," whenever he has reached the place where the elementary school has little if anything more to offer him that he can take and profit from. If the junior high school or the high school has something more suited to his education, he should receive a certificate of promotion or graduation. In Oakland this certificate is marked "promoted on special-class work."

6. What about course-of-study requirements? What about county or state examinations for eighth-grade graduation? These problems depend upon the prevailing educational conceptions and upon the coöperation existing among school administrators, teachers, and the com-

¹ A further difficulty in dealing with parents arises out of the need for transportation across the city or to any considerable distance from home. Rarely can consent be obtained for the transportation of inferior children from primary grades.

munity. In all cases we must advise the teacher to use her best judgment of what is right to do in the position in which she finds herself. One may have a strong need to reach the other side of a river, but the ferryboat will not cross until tomorrow. One may find it prudent to stop to think before plunging in to risk his life in the rapids. The right thing done at the wrong time or in the wrong way may easily become the wrong thing to do. The teacher who works in a community or in a city under a rigid administration that is not in sympathy with the ideas set forth in this book must learn to await occasions. The public school system as we now have it is the result of evolution. It did not just happen. Its conditions and practices have been brought about by natural causes. Our public schools are of democratic origin. The fundamental practices of such an institution are never wholly good or wholly bad. Desirable changes are not brought about as rapidly as the most active leaders desire, nor do they await the inertia of the unthinking. Changes that are fundamental and lasting must be founded upon a real need. If the classification of pupils according to individual abilities is sound, it will be accepted when it is understood. The teacher will not be able to go far in carrying into effect such a plan of promotion and classification as we have advocated unless she has the sympathy and coöperation of her administration; and the school administration will fail unless it has the intelligent coöperation of the teachers. Both will fail unless they can hold the confidence of the community.

However, the policies we are describing are not mere theory. They have been in actual operation for a number of years, gradually developing in complex city systems until now they involve many hundreds of teachers and many thousands of children. Nor are these policies to be considered as applicable to city schools only, for they relate to

problems which are fundamentally the same in country, town, and city. Wherever this conception of education is adopted, its functioning must finally rest upon the classroom teacher and her relationship with the individual child. No system of classification and no scheme of promotion will ever remove individual differences as a problem for the teacher who has more than one child to instruct. Adjustment to individual differences demands of teachers greater understanding and better skill than is needed under the more formal and orderly procedure of current classroom practices.

7. Should the limited-class pupil be graduated from high school? Our universities now graduate their students from colleges of engineering, agriculture, law, etc. One must know the course which a university student has taken in order to understand the type of training he has had. Our high schools graduate pupils some of whom are recommended for university and college entrance, while others are not. High school graduates have pursued widely different courses, such as commercial, college preparatory, or industrial. Hence, it is only one step further to give a certificate, properly marked, to show the type of training which a pupil has been able to take and the quality of work which he has done in the high school. If the high school will adjust its program to give training suited to the needs of those with inferior mentality, and if such students have faithfully applied themselves for four or five years, thus better fitting themselves for life's work, why should they not have a certificate of promotion or graduation showing the nature of the work that has been accomplished? The high school should find a way to do this, and by so doing it need not in any way lower high school standards or cheapen the high school diploma. The diploma should not be considered as a blanket voucher for every type and quality of training. It must show both the kind and quality of work done before one can judge its worth.

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SUMMARY

1. Owing to the fact that the child of inferior ability has difficulty in accomplishing standard classroom work, he demands continuously an undue amount of attention from the teacher.

2. Inferior mentality is the chief cause operative in producing failure under the present organization of the curriculum in the elementary school.

3. If we are to change the conditions which produce failure, we shall have to work out differentiated course requirements.

4. Some administrative provision should be made for classification and instruction according to brightness and ability. This classification should involve for pupils below normal intelligence at least two groups: (1) special "atypical" classes for those of greatest mental inferiority; (2) special "limited" classes for those who cannot keep pace with standard requirements, but who can make some progress in simpler forms of regular grade work.

5. Such classification should begin with the first grade and should continue not only through the elementary school, but into the high school.

6. The needs of inferior students in junior high schools and in high schools cannot be met merely by electives or by reducing the number of subjects carried. The real solution can come only through classification and variation in curriculum requirements.

7. Special classes should be located in the same school with regular groups rather than in separate school units.

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CHAPTER NINE

MENTAL TESTS AND THE SUPERIOR CHILD

PROBLEMS ARISING FROM SUPERIOR INTELLIGENCE

The school's responsibility to the superior child. The child with superior intelligence has been more neglected than any other child in the school system. A democracy demands leadership, and leadership demands education of the highest order. Most of the superior children who attend our public schools have not been educated in accordance with their capacity. As a matter of fact, the education which they receive is sometimes damaging. No child will develop the proper use of his intellectual powers unless those powers are used approximately up to their maximum. If we analyze the school work that is given our superior children, we shall find that they have had little to do that would stimulate real interest or challenge their powers. They move along at an ordinary pace, and, unless they voluntarily do more than is set as the standard requirement for the grade, their "mental engines" are idle a good part of the time. The influence of idleness on mental habits and on attitudes, and the influence of these in fitting or unfitting one for the responsibilities of life and citizenship, are too obvious to demand proof.

Our school curricula were originally framed for the needs of superior children, who by the processes of selection were the only ones who continued in school. As education came to be looked upon as a right to which all the children of all the people were entitled, the course of study was modified in such a manner as to bring it presumably within the grasp of pupils of average capacity. A brief study of any large school will reveal the fact that from 10 per cent to 20 per cent of the pupils of greatest capacity,

and from 10 per cent to 30 per cent of those of least capacity, are not being taught as they should be. The standard curriculum fits fairly well the capacities of only the middle 50 per cent of our school population, though there is evidence that it is somewhat too hard for even the average pupil.

Classes for the mentally defective have long been in operation in most of the large cities of the country. On the other hand, very little attention has been paid to the superior child. Only within the last few years have public schools in a few places awakened to this responsibility. Numerous studies of gifted children are being undertaken in various parts of the country.¹ We may expect that within the next decade great impetus will be given to the proper care and education of those children who can do so much more than the average and who should have more to do if they are to develop the characteristics needed for leadership. The nation's greatest resources must be conserved.

Superior child not a weakling. It is commonly believed that the superior child is a highly nervous mechanism, and that he is prone to break down or to pass into the world as an unknown and uninfluential member of society. The studies which have been made show conclusively that this belief is not based upon facts. Children of superior intelligence are more often physically superior than are other children. They have emotional balance and are not as a rule one-sided or eccentric.

It is, of course, conceivable that a superior child might be overstimulated to the point of mental breakdown. No one would advocate that the superior child should be crowded in his work beyond that order of accomplishment which is normal and natural to his exceptional ability. If he is physically weak, he should be given the kind of exercise and

¹ One of the most notable studies of superior children is that recently undertaken by Dr. Terman of Stanford University and financed by the Commonwealth Fund.

play which will make him physically equal to the strain incident to a reasonable amount of school work.

Grade location of superior children. Any teacher who makes an analysis of her own room with reference to the chronological ages of her pupils will usually find that the youngest children in the class are doing the best work. She will, perhaps, immediately conclude that the school has already met the problem of the bright child by allowing him to advance more rapidly than his slower classmates. In some instances this may be true; but if the same teacher makes a distribution of the mental ages of her pupils and compares these with grade placement, she will not be so sure that the school is meeting the problem as it should be met. Investigations have consistently shown that the child with a superior IQ (120 or above), while he may be more or less accelerated for his chronological age, is more often retarded than not, when his mental age is considered; that is to say, he has not been allowed to advance at a rate commensurate with his growth in ability and is in a grade below that for which his mental age would fit him.

A study of 92 superior children in the Oakland schools is only one of many investigations which reveal this fact. Of these children 70.6 per cent were advanced for their chronological ages; 69.6 per cent were from one to five years retarded for their mental ages. This evidence again corroborates Terman's statement that superior children furnish the greatest per cent of retardation in our schools. Note the following examples:

Helen M. has an IQ of 153; a C. A. of 9-11; and an M. A. of 15-2. She is in the low-fifth grade, and is therefore about six months advanced for her chronological age. Her mental ability, however, would place her in the first year of high school. She is doing very superior work in her grade, but evidently it is mere child's play for her.

Albert L. was in the high-seventh grade. C. A. 11-10 (one year under-age for his grade); M. A. 17-8; IQ 149. He was, therefore, five years below the grade suited to his mental ability. After the test had disclosed his exceptional power he was advanced rapidly, and is now (just six months later) doing first-year high school work very creditably.

School work of superior children. The school work of the children who test exceptionally high is usually very superior in whatever grade they are found. Of the 92 superior pupils referred to above, 77 per cent are doing school work at least above the average in quality, and over 50 per cent are rated by their teachers as "superior" or "very superior" in classroom attainments. When mediocrity appears in the school-work of the mentally superior child, it can usually be explained on the basis of ill health, temperamental traits, or home and social environment. When such disagreement exists between the test result and the child's actual accomplishment in school, it becomes a problem that often taxes the teacher's ingenuity and ability to get to the bottom of the trouble and to make the wisest adjustment. The disagreement simply brings out in large letters the question, Why? Only when this question is answered satisfactorily should the principal or the teacher rest content.

It may be that the child has good ability, but because he has not been given opportunity to exercise that ability, he has failed to develop the proper interest. Effective operation may be blocked by the lack of material upon which to operate effectively. If you, as a grown man or woman, were to be sent into the kindergarten and told to play with the blocks, there would be little interest or effort displayed in your response; just so the sixteen-year-old mind of a boy finds little to attract his attention, to develop his interest, or to tax his effort in the daily tasks of the fifth or sixth grade. Give him a chance to delve into something worthy of his capacity, and his bored

expression and listless attention may give place to an eager interest in the new round of activities, with corresponding results in his accomplishment. Frequent cases of this kind have been met in school administration, the adjustment of which has brought to both principal and teacher the satisfaction of knowing that they have helped an individual life to reach its own level of mental attainment and thus to be better fitted for meeting future problems and responsibilities.

How to discover the superior child. There are two methods that any teacher may use in discovering the superior child, each of which should be considered a check upon the other. These are: (1) mental-test results; (2) quality of school work. Any child who gives evidence of exceptional classroom accomplishment and whose ability by mental test is shown to be above the grade in which he is working should be considered for extra promotion, providing physical, temperamental, and environmental conditions are not unfavorable. The probability is that a child who is at-age or under-age for his grade and who is doing excellent school work is superior in ability. However, excellent classwork alone should be used very cautiously as a basis for determining what child is superior. There are many factors which may enter to produce good accomplishment without any real exceptional capacity. The child may be chronologically over-age for his grade; he may be repeating the grade; his industry may be such as to prompt him to put forth unusual time and effort to attain creditable results; he may be receiving extra help outside of school; or his mind may be of a type that permits him to memorize mechanical work — as, for example, the four fundamental processes of arithmetic or facts of history and geography. Such possibilities must be considered and must be checked by an intelligence test before we can finally judge a child as superior.

On the other hand, a high mental-test result should not be accepted as final without due consideration of all other factors involved, notably school progress and accomplishment. A superior IQ indicates superior brightness, but the child of high IQ should not be accelerated unless his classroom work is also superior or unless sufficient reason appears for its being otherwise. In every case the *whole* child must be considered with a view to taking such action as will be best for him individually. If health, temperament, and environment seem to warrant it, by all means let his superior ability be given an opportunity to cope with the tasks for which it is by nature fitted, but not otherwise.

Need of caution in recommending extra work for superior child. The following case illustrates the necessity of caution in recommending extra work for a child :

Harry was a boy in the high-eighth grade, preparing to enter high school. C. A. 12-0; M. A. 16-0; IQ 133. He was doing excellent school work, was studying piano outside of school, and in many other ways gave evidence of his superior mentality. His high school course for the first year was to be determined. The school counselor, who aided in planning his work, naturally concluded that he could carry not only the regular four high school subjects of a college preparatory course (Latin, English, mathematics, and history), but that he could without difficulty add a fifth subject to his program — drawing, which involved two additional periods of school work. Such was the program chosen, when it was discovered that Harry was suffering from serious heart trouble and that, instead of taking additional subjects, he was physically hardly equal to carrying the regular program. Readjustment was of course necessary.

Contrast with this case the following: Alfred was also in the high-eighth grade. C. A. 11-11; M. A. 14-5; IQ 121. Scholarship record throughout the grades was excellent. At

three different times he had covered two terms' work in six months, and once he completed three terms' work in one semester. His teacher said of him: "Alfred is an alert, heavy-set, pugnacious chap. He always gives the impression that he is going to get everything he is entitled to. He is quite often in trouble for infractions of schoolroom rules, but on the whole is pretty well liked. He likes mathematics and drawing and is very musical. He owns and plays a very fine violin. He doesn't care much for reading, for 'it takes too much time.' He says he has never read a book that he hasn't had to read in school. His life ambition, which he says he has definitely decided upon, is to be a civil or electrical engineer. His first term's program at high school has been planned as follows: algebra, English, drawing, and Latin, with general science and orchestra suggested as extras, since he seems to need a lot of work to keep him steady."

Both these boys possessed superior mental power recognized by their teachers; but one had a physical handicap which made it dangerous for him to be permitted to forge ahead as his more sturdy companion could do. Every handicap, be it physical, social, or temperamental, is a possible hindrance to a child's progress in any grade, from the first through his university course.

MEETING THE PROBLEM IN THE ELEMENTARY SCHOOL

Importance of normal social contacts. As with the inferior child, so with the pupil of superior mentality, complete segregation into a separate school, as is advocated by some authorities, does not seem to us advisable. Let the bright child have his social contacts with other pupils of every type and capacity, let him be a part of the cosmopolitan school and join in its general interests and activities, just as he will later become a part of a larger world where he will stand shoulder

to shoulder with men and women who may not be his equal in intellect, but who nevertheless touch his life from various angles and with various influences. Within that cosmopolitan school, composed of the mentally very inferior, the dull, the average, and the gifted, let each type of student be given that which will most nearly fit the need of his own development.

Classification in large schools. In a city school system, where there are enough pupils to form several sections of the same grade or half-grade, it is possible to organize in such a manner that the upper half of the group (if there are two sections) or the highest third (if there are three sections) will be composed of those pupils who by test and by teacher's judgment appear to be most capable either of making rapid progress or of covering a fuller program of work. When a class is thus segregated, the teacher can make assignments that will materially enrich the curriculum. She can go more deeply into the study of almost every problem that arises. The children will comprehend more quickly, will cover assignments more readily, and will reach out in all directions in search of material bearing upon almost any topic brought up for discussion. Such children will not only cover the work in the grade in less time, but will be immeasurably better prepared for the work in the next grade because of the broad foundation thus built.

Formation of groups in smaller schools. The teacher whose work is centered in the smaller school, where there is only one section of a grade, need not feel that there is nothing she can do to meet the problem of the superior child. For one thing, she may form two groups within the same room, based upon the relative mental powers of the pupils enrolled. This is a common practice on the part of teachers who are eager to make the most of each child in their classes. In one of the smaller schools in Oakland two groups of low-sixth-grade pupils began the term under the same teacher. One group was composed of fifteen pupils who, by mental test and by

teacher's judgment, appeared equal to rapid progress; the other was composed of the remainder of the class, who according to all data at hand were not more than average in ability. Both sections continued to work in the same room; but under the teacher's direction the smaller group of fifteen superior pupils covered an enriched curriculum and at the same time completed the entire sixth year of work in one semester, while the average group proceeded at the normal rate of progress. Two years have now passed since the superior group finished the sixth grade. All but two have remained in the same school, continuing through the eighth grade with regular classes, and are now being promoted to high school. All are reported as doing either satisfactory or superior work, and there has not been a single failure recorded in any term since their acceleration.

Individual attention. But what of the teacher who, after careful study of her class, finds that she has not enough superior pupils in her room to make a separate grouping? Possibly there are only three or four children in the whole class who stand out by reason of their superior mental ability. Or what of the teacher in the very small school who is responsible for two or three or four complete grades? And what of the teacher in the rural ungraded school? Each of these can find opportunity to render a service to the superior child. In the earliest type of public school in America, where the schoolmaster cared for pupils of all grades in a single room, each was permitted to advance at his own pace with such individual help from the teacher as he needed in his progress. The pioneer school was practically the equivalent of our modern ungraded school, and both lend themselves very readily to the differential treatment of children of unequal ability. Rural teachers frequently allow the pupil of superior intelligence to move ahead through the grades as rapidly as he is able to master the work, while another of more limited capac-

ity can barely cover the standard curriculum in the allotted time. If the rural teacher possessed as a part of her equipment the ability to give the mental test and to interpret its results, she would of course be safer in deciding just what rate of progress each pupil should be allowed to make.

What is true of the rural school is also true of classes which have several grades under the care of a single teacher. The superior child in one of the lower grades may be allowed to work in certain subjects with the pupils of the next grade higher, with the probability that by the end of the term or year he will have covered their assignments as well as those of his own grade. Even in the large school, where each teacher handles a single grade or half-grade, the same method of individual attention to superior pupils will lead to gratifying results. During the year 1919-1920 a certain school in Oakland reported forty children in various grades who had been accelerated at least one term through individual attention of this kind. Thirty-one of these had completed the year's work in six months; six had completed one and one half year's work in one year; three had completed two years' work in one year. All made good in school work in the advanced class and were again regularly promoted at the close of the year. This represents only one school. Data from many others could be presented if space permitted, showing a similar result. Almost never does a child fail after special promotion, when by teacher's judgment and by mental test he has shown himself worthy of such advancement.

Rapid progress vs. enriched curriculum. There are just two methods of handling the problem of the course of study so as to meet the needs of the superior child. The first is by accelerated progress through the grades, the second is by an enriched program of work. Which of these is the more meritorious? Should the child pass from grade to grade at the highest possible speed, or should he be given more in-

tensive work to do, broader projects, wider reading, richer experiences in relation to every subject in the curriculum? Our answer is that there should be a reasonable amount of both acceleration and enrichment. Even the pupil who makes extra promotions should do his work thoroughly and cover at least an average, preferably an enriched, curriculum. This does not mean that he must solve every problem of every lesson in the textbook, but that he should show himself the thorough master of all principles involved. Moreover, caution should be used against permitting the child of the very superior or genius type to enter the high school at too immature an age, when there is danger of his becoming a social misfit. There can be no hard-and-fast rule governing all cases. As a general principle, however, we recommend that, except in most unusual cases, approximately two years of acceleration within the first eight grades should be the limit for even the most gifted children. This would bring the child into high school at the age of twelve instead of fourteen; any pupil younger than that at high school entrance is, under present conditions, in danger of social maladjustment. The issue to determine is not "How soon can he break into high school or university?" but "How can he best be prepared for the work which he will later be called upon to do?"

"**Skiping**" a grade. Is the method of "skiping" a grade advisable? While it is desirable always to bridge any possible gap in a child's school experience, there are, nevertheless, many children who have a mental age so far ahead of the grade in which they are located that they may safely be allowed to skip. This is often the case in the primary grades where the gifted child is likely already to have the mechanics of reading and number work which are to be skipped. In fact, the best place for acceleration is in the earlier years of school life, before the more complex subjects of the curriculum, which provide unlimited opportunity for enrichment,

have been taken up. In every case, however, care should be taken not to allow a vital gap to occur in the pupil's knowledge. Whatever he needs as essential preparation for the more advanced work of a higher grade should be supplied before he is allowed to go on. The problem involves, to be sure, the question of economy of time in preparation for life. But to what extent may one economize without losing essential training? The excellent results which have been obtained through the socialization of classroom activities have not taken away the necessity of a certain amount of drill work; and to the extent to which the pupil needs that drill before being able to assimilate and to apply intelligently a given principle, whether it be in arithmetic, language, science, or any other subject, to just that extent it is necessary to limit his acceleration. Every case is an individual problem.

MEETING THE PROBLEM IN THE HIGH SCHOOL

Additional subjects. Classification to meet individual needs should not be limited to the elementary school. The pupil of superior intelligence must find in the high school that which will stimulate his interest, challenge his effort, and satisfy his ambition for accomplishment. There are several methods by which the problem can be met. The one that has been most commonly tried is that of permitting the capable student to carry more than the usual program of four subjects. Wherever such a procedure is carefully supervised, so that none but the deserving are allowed to take extra work and their progress is regularly checked as mid-term records are reported, valuable results have accompanied it. The danger of such a method lies in giving indiscriminate or injudicious permission to the mediocre or even the inferior student to add an extra subject to his program upon some purely personal plea. "I failed in a subject last term

and simply *have* to take five subjects to make up the credit." "I must graduate in less than four years' time." "Oh, I *do* want to take dramatics (or some other popular subject). It isn't hard, and I am sure I can do it." "I didn't study last term, but I promise I will this time." Such statements as these will sound familiar to any one who has had experience in dealing with high school students on the five-subject problem. Frequently it takes a sad experience of failure on the part of the student to make both him and the counselor realize that where mental ability is not equal to satisfactory completion of four regular subjects, there is little likelihood of success in a five-subject program. It is true, especially in the high school, that there are frequent causes of failure other than lack of mental capacity, such as health conditions, lack of application, or a social program which is too absorbing and leaves no time or inclination for work; but this very fact emphasizes the importance of checking up as accurately as possible the student's actual mental ability and of determining upon this basis the amount of work he is able to carry.

Success of extra-subject students. An investigation of conditions resulting from supervision of extra-subject students in one of the Oakland high schools brings us to the conclusion that such students, even with five or in some cases six subjects, make better records than the average pupil who is carrying only four subjects. In one semester there were 427 students (out of a total enrollment of 2100) who were registered for extra work. Slightly over 31 per cent of all the marks received by the five-subject students at the end of the term were "Excellent," while only 14.7 per cent of the grades given to other students were of this grade. On the other hand, the four-subject students failed in 8.0 per cent of their subjects, while those taking extra work failed in only 4.3 per cent of the subjects attempted. Under ideal conditions there would be no failures whatever in the group of students

permitted to carry extra subjects, but the fact that such failures are cut down by one half in comparison with those of regular students, while the percentage of excellent marks is doubled, reaching one third of all the marks received, shows that the superior pupil can carry extra work without endangering his school record. Similar studies made in other high schools corroborate these findings.

Accelerated graduation. High school graduation accelerated by one or even two terms is a frequent result of carrying more than four subjects. In the same high school of 2100 pupils mentioned above, and in the same term in which the records of extra-subject pupils were studied, 20 per cent of the graduating class of 183 students received their diplomas at the end of three or three and one-half years of high school work. The median age of these students was 17-6, while that of the whole class was 18-6. Approximately the same amount of accelerated graduation occurs each year in each of the Oakland high schools.

The saving of six months' time is often of tremendous worth to the high school student who because of economic need is anxious to complete his preparation for life work in the shortest possible time. In fact, it gives to every pupil, whether he is under financial pressure or not, the advantage of an earlier establishment in business or professional life. On the other hand, problems relative to the student's immaturity and to his lack of readiness for either college or business must be considered. Here again, as in the case of the elementary school, the matter is an individual one that should be decided with every consideration for the student's personal needs.

Excess credit graduation. As a result of the individual factors entering into each student's progress at high school, graduation in the regular time with credits exceeding the required number often takes the place of accelerated gradua-

tion. The superior student is permitted to carry extra subjects, not with a view to earlier completion of the high school course, but for the distinct purpose of enriching his course of study by giving him contact with as many different subjects of the curriculum as possible, or by adding to his regular program courses which will lead to a broader preparation for college and which will furnish additional basis for vocational choice. For example, a boy who easily led his class in scholarship with an unbroken record of "Excellent" marks to his credit for the four years of his high school course, completed the following subjects: English, 3 units;¹ Latin, 4 units; French, 4 units; Physical Science, 2 units; Social Studies, 2 units; Mathematics, 4 units.

This student graduated from high school with nineteen units of credit instead of the minimum of sixteen, as required for graduation from a California high school. The combination of courses which he took not only prepared him most effectively to enter any college of the university of his choice, but also gave him a broad vision and a rich experience with widely varying branches of the curriculum.

Classification of superior students. Neither of the methods outlined thus far, although both are the ones in most common use, has succeeded fully in meeting the need of the gifted high school student. The fact that pupils of both superior and inferior mentality may elect to take algebra does not mean that they can be taught satisfactorily in the same class, nor does it solve the teaching problem to permit a superior student to take Spanish as a fifth subject, only to find himself in a class with markedly inferior minds. The fact remains that dull pupils and bright pupils do not work well together in the same group. The only solution to this problem is either classification into different groups, or varia-

¹ One unit represents the completion of one year of work in a given subject.

tion of treatment and standards of accomplishment within the same group. Hence there arises the question of organizing classes suited to the needs of superior students. An example of such a procedure taken from the English departments of the Oakland high schools will illustrate the functioning of these classes.

In each of the four academic high schools of the city, the entering ninth-year students are classified upon the basis of a group mental-test score plus the school counselor's recommendation¹ into at least three groups, composed respectively of the bright, the average, and the dull pupils. During a recent semester the superior group in three of the four high schools was given an enriched course of study in English; the regular work was amplified and supplemented by additional reading, but no extra credit was given. In the fourth school the class completed one year's work in six months, and their teacher made the statement that the pupils were more responsive and did better work than the eleventh-year students who were under her care during the same semester. The same plan of classification is carried on as far as possible throughout the high school English course, though administratively it becomes increasingly difficult as the students move on to advanced work with widely differentiated programs and with consequent increased likelihood of conflicts in recitation periods.

Note the following comparison of term marks given by the same teacher in the same term to: (1) the pupils of a superior class in English; (2) a regular English class of the same grade:

TERM MARK *	No. 1's	No. 2's	No. 3's	No. 4's	TOTAL
Superior class	11	19	1	0	31
Regular class	4	12	14	1	31

* 1 = Excellent 2 = Satisfactory 3 = Pass 4 = Failure

¹ See Chapter X for discussion.

Both classes numbered thirty-one pupils. The superior class completed a year's work in one semester, while the regular class took the standard time for the work; yet eleven of the superior group earned a grade of "1," while only four of the regular class received a "1." On the other hand, fifteen of the regular class (50 per cent of the whole number) were given grades of "3" and "4," while only one of the superior students received less than a "2."

Sections of superior students have been organized in other high school departments, such as history, mathematics, Spanish, and typing. All the teachers concerned are enthusiastic over the response and coöperation which they receive from such students. One teacher says of a group in algebra: "There is absolutely no trouble with discipline, and the attitude in this class is decidedly different from that in the regular algebra class. The pupils grasp what I say very quickly, repetitions are seldom necessary, and at the end of each lesson I feel satisfied that practically every one in the class has grasped the point I have tried to make. I have had time to cover the usual assignments and have also found opportunity to bring in considerable special work."

Weighted credit. In the smaller high school, owing to smallness of numbers, it is frequently impossible to organize even two sections of the same grade of work in the same subject. To meet under these conditions the problem of the superior student there has come into favor in some quarters a plan of "weighted" or "graduated" credit, by which the amount of credit earned in a subject is determined by the degree of relative accomplishment. Extensive projects, supplemental reading and reports, additional voluntary assignments of advanced work, — in fact, any carefully chosen work suggested by the teacher beyond that required for normal achievement, — is used as the basis for granting extra credit in the course. Such extra credit is the incentive

frequently needed to stir the superior student's ambition to accomplish more than his fellows; for the high school pupil, even though of unusual intellect, is prone to be human and to show no great eagerness to do more than is required unless he has promise of something in return for his labor. In industry, piece work furnishes the rapid workman a chance to earn extra pay. Extra work "for the good of the health" does not appeal to the adolescent youth any more than it does to the grown-up.

IS SEGREGATION OF SUPERIOR PUPILS DEMOCRATIC?

One frequently hears as an objection to segregation of superior students in either elementary or high school the statement that such action is not democratic. It is argued that life is not an arrangement by which all of exceptional capacity are grouped together in their own small compartment, but that all kinds of people must mingle; that such is the essence of true democracy. Any scheme of classification in the schools on the basis of mentality is therefore regarded as undemocratic and as conducive to egotism on the part of the pupil so segregated.

We all agree that the spirit of democracy must be nourished in our schools. It has been well said, however, that "democracy does not mean equality of achievement, but rather equality of opportunities for achievement. Where this kind of equality is provided, the gifted student will have the attention which is so essential to his individual development and so important to the training for leadership in a democracy."¹ Democracy demands that its future leaders be given the opportunity to achieve all of which they are capable, instead of being satisfied with what would be for them mediocre results gained through mediocre effort. In what way

¹ W. H. Hughes, "Providing for Individual Differences with Respect to Instruction, Scope of Work, and Credit." (See references at end of chapter.)

can this be better realized than by just such classification as has been advocated in this chapter, where those of keener intelligence are not hindered in their progress by the endless repetition and drill that are so necessary for the slow? Even within such a group of brighter minds there will always be sufficient difference in mentality, in interests, in previous experiences, and in viewpoint to give room for different grades of achievement, thus insuring the presence of competition. Competition with one's intellectual equals or superiors will have a tendency to diminish egotism rather than to stimulate it, particularly if principal and teachers avoid bringing such groups into any special prominence in the school. Furthermore, when the student who has studied within our school walls leaves his period of training to take his place in industry or professional activity, he will proceed at his own rate of progress with no thought of being governed by the pace of his slower fellow-citizens. In social and civic life they may be brothers in the true spirit of democracy; yet in their relative achievement of success and of leadership they may be separated as widely as the poles. So in our schools, each should be permitted — even be urged when pressure is necessary — to advance as rapidly as his ability will permit, regardless of the pace set by his fellow-students.

SUMMARY

1. The child of superior intelligence has been neglected more than any other in the school system.

2. Intellectually superior children are quite as often physically superior as are other children. Therefore they are as well able as the average child to cope with problems commensurate with their ability. This does not mean, however, that the intellectually superior child should be crowded or forced in his school work.

3. Superior children are usually found to be retarded in grade location if actual ability is considered.

4. Both quality of school work and mental test should be taken into account in identifying the children who are not working up to their ability.

5. There are two methods of meeting the needs of the superior child in the elementary school: (1) rapid promotion; (2) enrichment of curriculum through extra work. These may be applied either to entire groups of children or to individuals within a group.

6. Because of complicating factors that may arise from physical, social, or temperamental conditions of the child, caution should be observed in recommending either rapid promotion or extra work for superior pupils.

7. In the high school the common practices regarding electives and extra subjects are not an adequate solution for the problem of the superior student. In addition, there is need either of classification into different groups or of differential treatment and differential standards of accomplishment within the same group.

8. Segregation of superior students into ability groups stimulates a more natural competition. This competition with intellectual equals has a tendency to diminish the egotism so prone to develop in the student who recognizes himself as superior to his classmates.

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CHAPTER TEN

MENTAL TESTS AND GUIDANCE IN THE HIGH SCHOOL¹

MENTAL TESTS AS RELATED TO OTHER FACTORS

IN Chapters VIII and IX we have pointed out the means by which high schools have attempted to meet the problem of inferior and superior pupils. The organization of special classes and variation in the content of the curriculum, in the amount and standard of work, and in the rate of progress were discussed in detail.

Some or all of these means can be used in any high school. The ones most effective will vary for different schools and at different times. All of them involve a program of mental testing, for the most significant individual differences are found in the field of intelligence. The test not only furnishes evidence to help in the guidance of a pupil known to be a misfit but also reveals many misfit cases which have not been recognized as such. The pupil with excellent ability who is doing mediocre work represents wasted opportunity. He is a misfit.

The benefit derived from a testing program comes in part from the changed attitude of the teacher. It demands so much consideration of the abilities and needs of individual children that it tends to develop teachers whose attention is directed more toward the education of children than to the teaching of a subject.

Some high school data. The value of mental testing in the adjustments a high school must make is evident from scores of studies that could be quoted if space permitted. The pupils who drop out from each high school grade have a lower IQ median and a higher age median than that of the group of classmates who remain in school. The pupils who

¹ Dr. Margaret M. Alltucker, school counselor in the Berkeley high school, assisted in gathering data for this chapter.

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TABLE 28
RELATION BETWEEN INTELLIGENCE RANK AND OTHER DATA
(364 students entering tenth grade)

INTELLIGENCE RANK ¹	A	B	C+	C	C-	D	E
Pupils:							
Number	11	72	109	81	72	19	0
%	3.0	19.7	29.9	22.2	19.8	5.2	—
Median C. A.	13-10	14-11	15-2	15-7	16-1	16-8	—
School Progress:							
% acceleration	90.9	34.7	13.7	6.2	2.7	0.0	—
% retardation	0.0	2.7	15.6	32.1	62.5	89.4	—
Scholarship:							
% 1's	32.4	23.7	19.0	6.4	6.1	9.7	—
% 2's	57.8	59.0	52.0	49.9	49.4	38.7	—
% 3's	9.8	17.3	28.9	43.7	44.5	51.6	—
Average number credits per pupil	4.63	4.63	4.53	4.08	3.87	3.80	—
Industry Rating:							
Average or above	90.9	83.3	75.2	69.1	77.7	63.1	—
Below average	9.1	16.7	24.7	30.8	22.7	36.8	—
Health Rating:							
Average or above	90.9	84.6	85.3	87.6	82.0	84.2	—
Below average	9.1	15.3	14.7	12.3	18.0	15.8	—

Read the table thus: The group ranking A in intelligence numbered 11 pupils or 3.0% of the whole; the median chronological age of these pupils was 13-10; 90.9% had been accelerated one or more terms in school progress, while none were retarded; of the scholarship marks earned by this group 32.4% were "1's," 57.8% were "2's," 9.8% were "3's"; the average number of credits per pupil earned in the ninth grade was 4.63; 90.9% were rated average or above in health, while 9.1% were rated below average. Read similarly for other groups under "Intelligence Rank."

elect to go to a vocational high school or to vocational courses have a median IQ below that of pupils who elect the college preparatory courses. The pupil under-age for his grade makes higher marks in academic work than his at-age or over-age classmates.² In Table 28 we present an array of data

¹ The intelligence rank for each pupil was based upon results of the Terman Group Test of Mental Ability. For interpretation of rank see page 118.

² In vocational courses, data thus far obtained indicate the reverse; i.e., that the work of under-age pupils does not rank as high as that of the at-age

embracing 364 students — all who entered the low-tenth grade of the Berkeley high school during one semester.

Some of the important facts revealed by the table are the following :

1. The distribution as to intelligence shows a total absence of students ranking E on the mental test. Evidently pupils of extremely inferior intelligence did not reach the high school in this class. They seldom do.

2. The pupils ranking A in intelligence show a median age of 13 years 10 months ; those ranking B show a median age of 14 years 11 months. As the intelligence rank decreases, the median age increases regularly, until those ranking D in intelligence show a median age of 16 years 8 months. Thus there is an average difference of three years between the ages of tenth-year pupils ranking A and of those ranking D in intelligence. Similarly, all studies have shown that our most superior pupils in academic high schools are the youngest.

3. With reference to the type of progress made in school, 90.9 per cent of the students ranking A in intelligence have been accelerated one term or more. The per cent of acceleration steadily decreases as we go down the scale, until no one of those ranking D has made rapid progress at any time during his school career. On the other hand, no one of those ranking A has ever been retarded in his school course, while 89.4 per cent of those ranking D have failed one or more times.

4. In quality of scholarship, 32.4 per cent of all the marks received by the A students were " 1 " (Excellent) ; this per cent gradually decreases until we reach the students ranking D in intelligence. Here there is a slight increase in the number of " 1's " earned. It is an interesting fact that every

and over-age groups. Apparently in such courses maturity and additional years of experience outweigh greater mental alertness when coupled with immaturity.

mark of "1" received by these students was obtained in woodwork, cooking, or sewing. The per cents are practically reversed when we consider scholarship marks of "3" (Passing).

5. The average number of credits earned in the ninth grade decreases as the intelligence decreases.

6. With reference to industry, the ratings of the teachers show that the more intelligent pupils rank higher than the less intelligent.

7. It is very significant that those ranking highest in intelligence have also been given the highest health rating. This is an indication that superior pupils are not the physical weaklings that some would claim them to be.

Data of the kind presented in this table will help to convince any "doubting Thomas" among high school teachers that mental-test results have a very positive relationship to a number of factors closely bearing upon a pupil's life. One frequently hears statistics quoted showing the value of a high school or university education in terms of increased earning power and increased ability for service. There is no doubt that training in high school or university has great value in developing the native ability of a student and in preparing him for more effective service. However, neither the university nor high school can *make* good minds; it can only attract them, train them, broaden their vision, and help to set goals. Why does "Who's Who" draw so largely from the ranks of college men — because they went to college, or because, having an IQ that permitted them to go, they did so and profited from it?

SOME PROBLEMS OF CURRICULUM ADJUSTMENT

Uniform requirements not desirable. In most states school laws require either full-time or part-time attendance up to the age of sixteen or eighteen years. We must ac-

cordingly plan an educational program which will give adequate training to all children for ten or twelve years. With the vast differences in capacities, needs, and destinies of these children who come from every type of environment in our cities and rural districts, and who will go into every type of work and of social activity known to the next generation, it is evident that a uniform course of study for all is neither feasible nor desirable.

Of our public school pupils a select few will mount to the top of the educational ladder and graduate from a university; others will stop when they finish high school; but, under present requirements, the majority will never complete the ninth grade. There are two main reasons for this tremendous exodus from the schools: first, many pupils are not sufficiently interested to put forth serious effort; second, many have not the capacity, even with effort, to do the required work within the time allotted — some cannot do it even with extended time. Early in the elementary school career we can discover those who can probably graduate from high school or college if they have an opportunity; we can likewise discover those who have little chance of being able to complete a high school course even with opportunity forced. Between these extremes are the rank and file of pupils, representing average ability. The limit to which these will progress in school is determined not only by intelligence but also by interest, industry, health, and opportunity for school attendance. It cannot be too often repeated that we must think of the best education we can give within ten or twelve years, not in ten or twelve grades.

About the home we have a box or a stool on which to step when we reach for something; for a short climb we have the sturdy stepladder built for solid confidence; next we have the sixteen-foot ladder that reaches to the roof; down town the firemen have extension ladders that enable one to climb to

the upper stories of skyscrapers; all are suited to climbing, but for different ends. Just so should we think of course-of-study ladders. They should be suited to the needs and purposes of children who can reach just a little way, of others who will climb in average fashion, and of still others who may climb to great heights. This leads to a consideration not only of different courses, but of guidance and counsel in those courses.

Variation involves election. One argument for the organization of the junior high school has been the need for a greater differentiation of courses to fit the ever widening range of interests and abilities of children above twelve years of age. To quote one writer on the junior high school, — “As we go up the scale in education there is need for increasing variability. We must pay tribute to the obvious differences as regards the gifts bestowed by the gods of heredity and by early environment. We should strive to strengthen some strong powers and might forego to strive for some for the foundation of which nature did so little.”¹

But what is the use of variation and election unless there can be some guidance of the child into that activity most suited to his needs? The majority of children go into junior high school or into senior high school to face election of subjects with absolutely no training in the choice of courses; they have no knowledge of their own fitness for this work or that, no knowledge of their needs, no goal at which they are aiming. Many are going to high school because the law requires it, parents have sent them, they want a good time, or because it is the custom. Nearly all are bubbling over with the exhilaration and unrest of adolescence. Instinctive and emotional feelings are strong. The present is glittering and powerful, the future is dim and far away. The potency of the thing that is, is master in most of their decisions. How

¹ David Snedden, *Sociological Determination of Objectives in Education*.

do these young people select their program of work? Mingle with them on enrollment day and listen. You will hear on all sides discussions of "snap" or difficult courses, of the popularity of one teacher or another, of personal friendships that beckon into this class or that. These three factors enter strongly into the choice of electives by high school pupils who are working without guidance; yet no one of them furnishes a satisfactory basis for election.

Election involves guidance. There are three important factors which should be considered in the pupil's program of election — ability, interest, and probable destiny in social and civic life. Every child needs counsel and guidance. He should get this first of all from his parents. The teacher or school counselor must supplement the counsel of the parents, in fact must often take the place of the parents for all guidance in the selection of courses. No child should be deprived of opportunity for at least a reasonable trial in any subject in which he has a deep interest. It is true that mental ability determines his probable success or failure in many subjects. His ability and his interest taken together furnish a better index of success, but these should be still further considered in the light of needs based on probable social attainments. The counselor should not only understand children but should know the educational needs of the various strata of social and industrial life into which children will go. The duty of a counselor is not to make the child's program for him but to aid him in the process of self-discovery and then to point out to him desirable goals and dangerous passages in the course which he proposes. There is danger in any vocational-guidance program in which a counselor attempts to direct adolescent boys and girls into a narrow preparation for some specific vocation. Sometime we may know enough about vocations and about the capacities of boys and girls to do counseling of this kind, but that time has not yet arrived.

THE COUNSELING PROGRAM

Counseling for high school entrance. Every pupil in Oakland and Berkeley who goes into the junior or senior high school has personal counsel regarding his program in the upper school by a teacher of the lower school known as "school counselor" and specially chosen for this work. The child studies what the upper school has to offer and, working with the counselor, makes out his program weeks or even months before he is ready to enter the upper school. Following is a brief outline of the work of a school counselor in the junior high school as she helps to program pupils for the senior high school:

1. Counselor's study of cumulative card or data sheet and case history of every child.¹ In this connection she considers capacity as revealed by all the intelligence and achievement tests which have been given during the term or earlier.

2. Conference between counselors of junior and senior high schools for careful study of the problems and the opportunities in each school.

3. Class instruction given to ninth-grade pupils in vocational and occupational civics, in which emphasis is placed upon the dignity of all legitimate work and upon the civic responsibility of each student to plan for himself some life work — preferably that for which he is by nature best fitted. This instruction includes:

- a. Methods of securing facts concerning occupations, with summary information covering several widely varying fields.

- b. Personal analysis; — how to study one's self to determine capacity and fitness for different vocations or occupations.

- c. Job analysis; — how to study vocations to determine opportunities and requirements.

- d. Study of a bulletin explaining all courses offered in the high school. This study is supplemented by a half-day visit to the high school in regular session.

¹ For cumulative card, see page 113; for data sheet, see page 185.

e. Development of the question, "Considering my interests, ability, social and civic outlook for life, what should be my educational plan?"

4. Making of pupil's program for first term in the upper school. This involves:

a. Pupil's conference with his parents with reference to high school courses as explained in the bulletin.

b. Pupil's selection of the program in which he is most interested and which he thinks will best fit his needs and capacity.

c. Individual conference between counselor and pupil with reference to subjects chosen.

d. Pupil's and parents' revision of the program in the light of any considerations brought out in conference with the counselor.

e. Second personal conference between counselor and pupil for final decision on the program for the first semester in high school. This program is recorded on the "introduction card," which becomes the child's admission card into high school. (See Figure 4.)

f. Parent's signature showing approval of the program on the introduction card.

g. Counselor's signature on the introduction card.

Mental testing in relation to counseling. We have described this counseling program somewhat in detail in order to illustrate the important function of mental testing in the study of individual differences and in the proper placement of pupils. The cumulative data show at least one mental-test record, and usually several for each child. Every counselor is trained in mental testing and in the interpretation of test results in the light of case history and other data. She is intrusted with the responsibility of counseling each individual pupil. She must not make snap judgments. She should have before her the cumulative data card furnishing evidence of each child's capacity, accomplishment, and characteristic development for eight or nine years or for whatever period he has been in our schools. She must interpret these data and make recommendation not only for the subjects

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FIGURE 4

FORM R. G. 104	OAKLAND PUBLIC SCHOOLS	BOY -----
INTRODUCTION CARD TO -----		GIRL -----
(DESIGNATE GRADE)		
Name -----	School -----	
(LAST NAME)	(FIRST NAME)	
Age -----	Address -----	Tel. -----
Eligible to -----	High School -----	
RECOMMENDED COURSE :		
1. -----		
2. -----		
3. -----		
4. ----- Date -----		
5. -----		
Alternative -----		
(OVER)		

Signature of Parent or Guardian -----

Address -----

elected but for classification into a rapid, normal, or limited group in the high school. In cases where such a card has not been kept, she secures a tabulation of data from the teachers for each child, as follows:

1. Chronological age.
2. Mental age.
3. IQ.
4. Intelligence rank by mental test.¹ (See page 118.)
5. Teacher's rating on school work.¹
6. Teacher's rating on intelligence.¹
7. Teacher's rating on industry and application.¹
8. Health rating.¹
9. Special comments of teachers relative to proper placement.
10. Pupil's educational ambition.
11. Pupil's expression of vocational interest.

The counselor's recommendations are put in writing. They are checked in future months against the actual record made by the child. Such a plan inspires careful thinking by the counselor and steady improvement in power for good counseling. As to the pupils, each has been looking ahead to his high school; it is not so strange, for he has visited it, he knows much about it, and he is already at least tentatively enrolled in it. Probably he has never before done half so much thinking about his own objectives in school and in life, or about the steps necessary to attain them.

Classification at high school entrance. Upon the pupil's entrance into high school there still remains the problem of classification into ability groups in each subject. The Alexander Hamilton School in Oakland had 166 pupils entering the low-ninth grade. All must take English, in which seven ability groups or classes were arranged as follows: 1 very superior; 1 superior; 3 average; 1 inferior; and 1 very inferior. The data used were the test score,² age, estimate of

¹ A seven-point scale is used for these ratings.

² Terman Group Test of Mental Ability.

TABLE 29
COMPARISON OF TWO ABILITY GROUPS IN ENGLISH

	PUPIL	TERMAN TEST SCORE	AGE	SCHOOL WORK ¹	CAPAC- ITY ¹	APPLI- CATION ¹
Very superior class	N. H.	160	14	B	B	B
	H. T.	144	14	A	A	A
	N. N.	140	13	C+	C+	C
	M. A.	131	15	C+	C+	C+
	S. T.	137	14	C+	B	C+
	N. R.	135	13	C+	B	C+
	N. Y.	133	13	B	B	B
	E. C.	153	12	C	C+	C
	L. T.	158	13	B	B	B
	D. L.	168	12	B	B	A
Very inferior class	K. E.	57	15	C-	C-	C+
	Z. D.	56	15	D	C-	D
	N. H.	18	15	D	D	C+
	W. L.	46	16	D	D	D
	N. S.	45	15	C-	C	C-
	A. N.	47	17	C-	C-	C+
	K. E.	45	14	D	C-	D
	N. N.	79	15	C-	C-	C+
	R. E.	19	15	D	D	B
	R. Y.	19	16	E	D	C+

school work,¹ estimate of capacity,¹ estimate of application,¹ and any special information furnished by the counselor of the lower school. In Table 29 are given the data for a few members of the very superior group, contrasted with those for a few of the very inferior group.

In former years pupils from these two groups would have been found working side by side in the same class with the same lesson assignment and the same standard of accomplishment. So successful has been the new method of classifica-

¹ Rating by teacher on seven-point scale; see page 56.

tion that neither pupils nor teachers in this school would vote to go back to the former plan. Although faculty members were asked to make changes to different ability groups whenever conditions warranted, only four pupils out of the 166 were changed during the first semester or at the beginning of the second. These four were all advanced to a higher group than the one in which they had first been placed.

Need of guidance throughout high school. The need of guidance for the pupil is not limited to the time of his entrance into high school, but is almost if not quite as great at all times throughout his school career. Daily in any large high school some pupil needs counsel regarding a change in program, a change in attitude toward work, or a change in the standards of accomplishment which he is willing to accept as satisfactory. In any large high school there should be appointed a counselor who may be called upon to assist in handling the most difficult cases, who may be approached for advice by any pupil (or teacher), and who will lead the faculty in the scientific study of how both the school and the pupil may best be adjusted to fulfill the obligation which each owes to the other.

However, careful study of pupils and proper adjustment of school conditions must constitute a fundamental part of the responsibility not only of a counselor, specifically appointed, but of every teacher. The high school teacher is usually a specialist in his work. His contact with each pupil is ordinarily limited to one class period per day, and his knowledge of the interests and activities of the pupil outside of this one class is likely to be very meager indeed. The tendency for an instructor in one department to know little and to care less about what happens to a pupil in another department is regrettable but very common, particularly in large high schools. The skillful handling of subject matter rather than the effective instruction of the child may easily engross

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the efforts of the teacher. Most courses of study have a rather specific outline of material to be mastered in a semester — a certain book in history, so many chapters in mathematics, or a list of selected classics in English. It is quite natural for the teacher to set up her standards of attainment on the basis of what is judged to be in keeping with a good high school course, without sufficient regard to what the course should mean to the individual members of the class. The instruction of any pupil in any subject will be certain to bear better fruit if the teacher has faithfully studied each pupil of her class with reference to such factors as mental ability, age, past achievement, interests, experiences, social environment, and life objectives.

Lack of proper guidance. The following case is typical of what has happened by way of counsel to many a high school student :

Henry wished to become a civil engineer. He was an unusually conscientious, hard-working, over-age boy of seventeen years, in the second semester of the ninth grade, repeating first-semester algebra because his teacher told him he "must have a good foundation in algebra in order to do satisfactory work in the later mathematics required for engineering." The pathos of the situation becomes striking when we know that this boy, who spent fruitless hours of labor on complicated problems in algebra, had an IQ of 83, that he had a record of repeated failure in the upper elementary school, with marks of "good" in conduct and "good" in attendance, and that in the first semester of high school he had earned barely passing marks in two subjects and failure in two others. The father, a rather shiftless carpenter, "didn't care if the boy went to school." The mother, a quiet, persistent woman, was determined that Henry, who is her youngest and her favorite son, "should get a good education and hold a good job," for his two older brothers

are now earning a bare living at hard menial labor "because they didn't like school and quit, one in the fifth, the other in the sixth grade." The next-door neighbor is a very successful civil engineer.

This case is illustrative of a dogged persistence, not altogether uncommon among high school pupils, in which effort that might otherwise be turned to good account wastes itself on impossible goals. There is not one chance in a hundred that Henry will finish three years of standard high school work. Why was he advised to repeat algebra "in order to do satisfactory work in the later mathematics required for engineering"? Apparently because his mathematics teacher knew more and thought more about the requirements for civil engineering than he knew or thought about the characteristics of the boy. Evidently he acted upon a single impulse gained from the mere statement of the pupil, "I want to be a civil engineer." This boy and his parent need counsel as to an educational objective more nearly within the range of probable attainment. Any high school teacher should be held responsible for detecting the need of such counsel.

Many misfits in the high school, however, are not due to poor mental ability but to a lack of effort. The following case is typical:

The chemistry teacher ordered Raymond to drop the subject. In discussing the matter with the counselor, the instructor indicated that "Raymond appeared to have good ability, but that he started to bluff his way at the beginning of the term; that he was more interested in having a good time than in doing his work, and that he was now (near the middle of the term) unable to make up what he had lost; that he had better drop chemistry because he was a nuisance in the class, and he was sure to fail even if he remained to the end of the semester." A mental test corroborated the teach-

er's judgment as to ability. Administrative pressure was brought to bear upon the situation; the boy was required to remain in the class, with the result that both behavior and class work improved. With slight variations, there are plenty of "Raymonds" in every high school.

Classification of failures. Failures in high school may be grouped under two general classifications: (1) those who "can't"; (2) those who "won't." Numerous variations are included in each type. Some teachers seem to feel that pupils who belong to either class have had their chance, and that they should be eliminated from high school and sent out to work. They argue, "Why should time be wasted in struggling with such pupils when there are others, both willing and able to work, who need the instructor's time and attention?" We agree that justice to all concerned demands that pupils of these two types be prevented, if possible, from interfering with those who are able and willing to move ahead. How does the high school attempt to meet the problem?

The three most common methods of dealing with the student who is failing in his work, whether because he cannot or will not do better, are: (1) reprimand; (2) failing marks or low marks; (3) removal or threat of removal from the class. However, the two types of failure do not need the same treatment. Those who have tried faithfully, but have failed because they lack the ability which the course presupposes, surely do not merit reprimands. We agree that many such pupils had better go out to work than remain in school if this means that they are to be compelled to keep up the hopeless struggle with courses unsuited to their needs and abilities. In many states, however, pupils cannot leave school because of compulsory-education laws. Therefore, if they are unable to take the regular work, a change in the type of course offered is the only reasonable solution.

Adolescent problem cases. Some pupils fail because of unavoidable absence or sickness or because of other reasons for which they cannot justly be held accountable. No one, of course, denies to such the right to continue in school and to repeat courses if necessary. But what shall we say of those who have ability but are indifferent about using it or who even refuse to try? Some of these merely prefer pleasure to work; others are careless and lazy; still others may openly boast that they "don't like school and don't intend to work," that they are in school because the law requires them to be, or because their parents demand it. Such pupils are serious problems. Should the high school be expected to retain them at all? Will they break down the standards of discipline and the standards of scholarship that should be maintained for the average or superior type of student? In exceptional cases it may be impossible to bring such students into line with respect to conduct and application, but the large majority can be reached with skillful handling. The public has a right to demand that high school instructors be held responsible for a high degree of skill in working with the adolescent youth, for the latter is subject to all the attitudes toward work that are common to the human stock in general, plus many erratic tendencies and fluctuations of ambition, pride, emotion, interests, and application that are peculiar to the adolescent age. Those who are not working as they should must have the kind of influence, guidance, or, if need be, pressure which is necessary to bring them into the effective use of their mental powers and to develop in them habits of industry and habits of thrift in the use of their time. But this implies both an understanding of the pupil and a reasonable opportunity for adjustments. The understanding must come through the training of the teacher; the responsibility of providing opportunities for adjustment must be shared by the teacher, the school administration, and the tax-paying public.

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In the past it has been easy for the high school teacher to say, "You must get out of my class," or "You will fail," and thus to eliminate in short order his most serious misfit cases. But the teacher of the future will be called upon to explain why the pupil should fail, and, if he must fail, to assist in determining what should become of him. What can the pupil do which will be better for him than to continue in this class? The common suggestion, "Take an extra study period to prepare the three remaining subjects," is scarcely adequate. Moreover, no pupil should reach the danger point of failing without having opportunity for a personal conference with the teacher, in which are considered the causes of failure and the possibilities of their removal. Anything less than this is unfair to the pupil.

Shall the regular high school train all adolescent youth? If all pupils who failed were dismissed from high school, what would be the result? The college preparatory course serves the specific needs of only a small fraction of the boys and girls of high school age. This course could be mastered, so far as intellectual capacity is concerned, by from one fifth to one third of all the remaining youth of high school age who do not plan to go to college. It is the easiest and least expensive type of course to give. It serves those who are most capable in that form of intellectual activity involved in the use of abstract ideas. But to meet social needs various other courses have been added along the lines of vocational and industrial training. Such courses are open to those pupils who do not elect to take or who cannot take the college preparatory course, but even in these courses the standards of attainment have been so inflexible that only those who are of superior mental ability can remain through the four years. The result has been, as we have already noted, that less than half of our boys and girls remain in school beyond the ninth grade.

The present trend of public opinion indicates that the high school is to be made responsible for the education of the adolescent child until the age of eighteen. If the regular high school does not assume the full responsibility, then a portion of that responsibility must be shifted to the part-time school. The idea that only those who are capable of taking on a high degree of intellectual polish or vocational skill shall remain in high school is giving way to the demand that even the ditch digger and the hod carrier have rights during the adolescent age to that educational direction which will help them to be better workers during their working time, and better citizens during their leisure time. The high school will receive the hearty support of those whose children get fair recognition.

Can the regular high school successfully assume the responsibility for the education of *all* adolescent youth? Should it attempt to do so? We believe that it can and that it must do so, in some cases for part time, in most cases for full time; that it should not only offer elective courses, but should vary the content of courses; and finally, that classification of pupils must be made according to ability to learn. We further believe that this procedure would raise, not lower, the standards of work for those of superior ability, that it would make for better discipline, and that it would result in the better training of every pupil for the duties of citizenship.

SUMMARY

1. Mental tests show a positive correlation with other factors closely related to the high school pupil's progress. An effective counseling program must, therefore, include mental testing as an essential feature.

2. In order to meet the varying needs and capacities represented among our high school students, there is urgent need of differentiation in curriculum requirements.

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3. Variation of requirements in junior high school and high school involves both election of subjects and classification of pupils in a given subject.

4. Election and classification require thoughtful guidance not only upon entrance but throughout the high school course. This should be provided by a school counseling program.

5. Every teacher, by reason of her relationship to her pupils, becomes a counselor, and hence should be familiar with mental tests and their significance.

6. The public demands that all adolescent youth should have some kind of educational training. The responsibility for this task rests with the high school.

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CHAPTER ELEVEN

TRAINING TEACHERS FOR MENTAL TESTING

SHALL TEACHERS GIVE MENTAL TESTS?

Conflicting attitudes of psychologists on mental testing by teachers. Mental testing has come to stay. It has grown to be so vital a part of our school organization that teachers everywhere are seeking information regarding its nature and training in its use. Shall they freely receive such information and training, or is the field a sacred precinct to be trodden only by the expert psychologist? This is a question that has received conflicting answers from various specialists in the field. Some would withhold from the teacher the right to use the mental test, particularly the individual test, on the ground that the average teacher does not possess the requisite psychological training to enable her to administer a mental test with reliable results or to interpret its findings with scientific accuracy. Others would grant to the teacher the right to know how to use intelligently the tool which has come to be an important basis for school classification and which contributes so much to her understanding of the children with whom she has to deal. We do not hesitate to say that every classroom teacher should be encouraged to study the use of tests, and that under proper guidance or certification many should be trained to give them. This does not mean that the teacher should be capable of devising and standardizing a mental test, or that she should attempt to make detailed diagnosis upon the basis of a test result; these are problems that belong to the sphere of the psychologist who has had specialized study and experience in the work. But to use the standardized formulæ for giving a test, to adhere to a standard method of scoring responses, and to adjust one's self reasonably well to the personality of the child — these are matters that come within the power of any intelligent,

conscientious classroom teacher. The owner of an automobile need not be an expert mechanic in order to be able to drive his car; if this were the case, few machines would be driven. The expert auto mechanic knows all about the construction of an automobile; he can take it to pieces, put it together, tune up the mechanism for smoothest running, and if there is trouble he knows how to search for the cause. To the owner of the car none of these things may be known; yet he is certainly not prevented from operating with intelligence and skill the car that some one else has put together. Just so, let the research worker develop and standardize tests, let the psychologist diagnose the difficult problem cases, but let the teacher use the test that the specialist has devised.

Value to teachers of familiarity with testing. As long as mental testing was applied only to the inferior child or to the institutional case, it was well that its use should be limited to the expert psychologist. Commitment to an institution for the mentally defective certainly should never be made except upon the recommendation of a specialist. At the present time, however, the fact that mental testing has come to be so intimate a part of the school program, applicable not merely to one class of children but to all children of whatever capacity, makes it imperative that teachers should know a good deal about it. How can a teacher reach a more accurate understanding of a child's ability than by watching his responses to an intelligence test and by checking them against his work and general behavior? How can she better help him in his school adjustment than by realizing the significance of his mental-test result?

TRAINING FOR MENTAL TESTING

Need for training before giving Binet tests. While some have claimed that none but specialists should be allowed to

do intelligence testing, others have voiced an opinion diametrically opposed to this; i.e., that any one, with possibly an hour or two of preliminary study, can give even the Binet test. Such a point of view is dangerous, for a standardized test must be given according to standard procedure, and accurate and constant adherence to standard procedure presupposes conscientious study and practice; there must be no tendency to substitute one's own ideas for the established formulæ. Any one who has had experience with the administering of the Binet test in any of its revisions knows what innumerable possibilities exist for differences in scoring, particularly by examiners who have not been thoroughly trained. Where large numbers of examiners are using the same test and expect to secure comparable results, there is absolute necessity for a highly developed standardization of scoring and rigid conformity thereto. Hence, for the mere purpose of giving and scoring Binet tests, careful preliminary training is essential.

There is a second feature of the work about which the efficient mental examiner should have definite knowledge. The general principles underlying mental testing and its application to school classification must be familiar to all who are called upon to give advice regarding the school work of the child — advice that is based at least partially upon test results. Such information can be gained only through careful reading and self-education, or, better still, through a course of training involving lectures, class discussions, and demonstration testing.

Opportunities for training. Such training is now offered in many universities and teachers' colleges, both in the regular session and in summer schools. The course as given in a six weeks' summer session must be limited in scope and cannot provide for all the practice work in giving and scoring Binet tests that is desirable. Nevertheless, the intelligent

teacher who has completed such a course and is willing to continue her own education and training by conscientious study of the directions laid down in Terman's *Measurement of Intelligence*¹ is ready to begin the administration of the Binet Test to her pupils. For a considerable time, however, she must work cautiously, without relying too much upon the mental ages she obtains, and without attempting to make diagnosis upon the basis of her results. Her training will be far more satisfactory if she can have a certain amount of practice in giving tests under the personal supervision of an experienced examiner, in order that her accuracy in giving and scoring may be checked and her ability in securing whole-hearted response from the child may be developed.

Method of training in Oakland and Berkeley. To meet the needs of teachers in service, city school systems in various parts of the country which have had available the services of a department of research or psychology have provided the opportunity for those interested in the work to take a course in individual intelligence testing and to secure the necessary amount of practice testing under supervision. In Oakland a beginning of such training was made in 1918, when a group of first-grade and kindergarten teachers took up the study under the Director of the Bureau of Research and Guidance.² Since that time the course has been offered each term, covering fifteen weekly lecture and discussion periods on the principles of mental testing. In addition to this class instruction, each teacher who desires to go further in the work is asked to submit for correction the records of a number of preliminary individual tests made by herself. Through a

¹ In Oakland and Berkeley the Stanford Revision of the Binet Scale is used almost exclusively for individual testing. Teachers using any other revision, such as the Goddard Revision or the Herring Revision, will need to secure instructions designed for the same.

² The work was begun under the same direction in the city schools of Berkeley (California) in 1919.

personal conference with a representative of the Bureau of Research on every examination given, the attempt has been made to bring about strict adherence to procedure, accuracy in the mechanics of scoring, and growth of judgment in the general work of pupil classification. After a sufficient number of examinations (usually from sixteen to twenty) have been made and corrected to warrant a reasonable familiarity with the technique and general method of giving and scoring, a final Binet test is given by the teacher before a member of the Bureau of Research and Guidance. Upon its satisfactory completion a certificate for Binet testing is issued, and the teacher is henceforth known as a "certificated mental examiner."

Even at this point, however, the training for Binet testing is not complete. Tests submitted by a certificated examiner are still checked from time to time, and errors found are called to the attention of the teacher concerned. It is at this time, after certification has been granted, that the real value of the training course is on trial. If it is worthy of the time and expense put upon it, then executives and administrators must be able to place a reasonable amount of dependence upon the results obtained after certification. That such time and expense have been amply justified in Oakland and Berkeley has been proved by the study of results secured.

In the year 1922 the number of certificated individual mental examiners was 125, with 85 additional teachers under training. The fact that there is so large a number demands the most careful checking of results; only thus can accuracy in the use of standard procedure be assured and confidence in the results be maintained.

Accuracy before and after certification. Table 30 gives the comparison of the accuracy¹ of test results before and after

¹ The word "accuracy" is here to be interpreted as the absolute accuracy of the Binet test results, as determined by the scoring and mechanical pro-

certification of 23 examiners who were certificated during the school year 1920-1921. The number of tests given by each examiner previous to certification is noted, with the number of these which were absolutely correct in the result and the corresponding per cent of accuracy.¹ Similar data are given for tests made by these examiners during the same year after certification had been granted.

Table 30 shows improvement in all but three cases. The three examiners who showed no growth were carefully watched for further development, and since that time all have improved in their work. The median per cent of accuracy in test results for the whole group of 23 examiners was raised from 53.8 per cent before certification to 81.2 per cent within six months after the certificate had been granted; in other words, 81.2 per cent of all tests submitted by these examiners in the first six months after certification did not need the slightest correction in the result. Clearly, from this standpoint alone, the instruction and conference work given have been eminently worth while.

Extent of error in test results. We shall next consider the average amount of correction necessary for the tests showing one or more errors. To determine the degree of inaccuracy before certification as compared with that which appeared after certification, the results of each of the 23 examiners were again studied with respect to the seriousness of the errors made. The facts are shown in Table 31.

cess of computing the intelligence quotient. It does not always imply a perfect accuracy in scoring each section of a given test, since one or two errors may be made in scoring a test which consists of several parts without affecting the final result. It frequently happens that two errors in scoring cancel each other in the computation of the mental age. Hence the tables which are given are concerned wholly with test results as finally expressed by the mental age and intelligence quotient; the slightest change made necessary in the result as found by the examiner, even though it consists of only one point in the IQ, marks the test as incorrect.

¹ The per cent of accuracy for each examiner is the ratio of the number of correct tests submitted to the total number of tests made.

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TABLE 30

PER CENT OF ABSOLUTE ACCURACY OF BINET TEST RESULTS
BEFORE AND AFTER CERTIFICATION

(Considering 23 examiners certificated in school year 1920-1921)

TEACHER'S No.	BEFORE CERTIFICATION			AFTER CERTIFICATION		
	No. Tests Checked	No. Tests Correct	Per Cent Accuracy	No. Tests Checked	No. Tests Correct	Per Cent Accuracy
1	10	9	90.0	16	15	93.7
2	16	13	81.2	13	7	53.8
3	14	11	78.5	16	13	81.2
4	18	14	77.7	25	20	80.0
5	76	54	71.0	25	19	76.0
6	10	7	70.0	46	38	82.6
7	15	10	66.6	20	11	55.0
8	8	5	62.5	21	19	90.4
9	45	27	60.0	20	12	60.0
10	23	13	56.5	10	8	80.0
11	16	9	56.2	10	9	90.0
12	13	7	53.8	20	17	85.0
13	15	8	53.3	10	9	90.0
14	10	5	50.0	10	9	90.0
15	32	16	50.0	10	10	100.0
16	10	5	50.0	10	10	100.0
17	8	4	50.0	28	20	71.5
18	35	16	45.7	15	12	80.0
19	13	5	38.4	25	17	68.0
20	27	10	37.0	84	60	71.4
21	14	5	35.7	20	17	85.0
22	14	5	35.7	13	11	84.0
23	20	5	25.0	23	18	78.2
Median per cent of accuracy			53.8	81.2		

Read the table thus: Teacher No. 1 previous to certification submitted for correction 10 tests of which 9 were correct; hence the per cent of accuracy was 90; within six months after certification she submitted 16 tests, of which 15 were correct, with a resulting per cent of accuracy of 93.7. Read in the same way for each teacher of the group. The median per cent of accuracy for the whole group *before* certification was 53.8; *after* certification, 81.2.

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TABLE 31

EXTENT OF ERROR IN TEST RESULTS

(Considering 23 examiners certificated in school year 1920-1921)

	BEFORE CERTIFICATION		AFTER CERTIFICATION	
	No. Tests	Per Cent Tests	No. Tests	Per Cent Tests
Error of 1 to 3 points in IQ	92	80.1	98	87.6
Error of 4 to 5 points in IQ	13	10.9	8	7.1
Error of 6 to 10 points in IQ	7	6.3	5	4.4
Error of more than 10 points in IQ	3	2.7	1	0.9
Total	115	100.0	112	100.0

Read the table thus: Of 115 tests submitted before certification, 92, or 80.1 per cent, showed an error of 1 to 3 points in the IQ; 13, or 10.9 per cent, showed error of 4 or 5 points in the IQ; etc. Read similarly for tests submitted after certification.

The median error for all examiners both before and after certification was 2 points in the IQ. However, the grosser errors of 6 or more points decreased appreciably after certification, while those involving from 1 to 5 points form an increasingly large per cent of all errors made. Errors of more than 5 points resulting from the mechanics of scoring must be eliminated if the test result is to function successfully in pupil classification. Careful training and closely supervised practice, with special help on doubtful cases, are necessary to accomplish this.

Duplicate test results. Numerous factors, other than the mere scoring of an individual test after it has been given, are involved in the accuracy of test results; i.e., (1) personality of the examiner; (2) degree of rapport which she succeeds in establishing with the child; (3) degree of faithfulness with which she adheres to the standard technique of giving the

test; (4) freedom from interruption and distractions during the test. Such factors as these can be directly checked only by observation of practice testing. Frequently it is necessary to have several examinations made under observation before a certificate can safely be granted. The same factors, of course, influence group test results as well.

Another method of checking results is to compare tests made of the same child by two different examiners. If the results correlate closely, one may conclude that both are probably not far wrong. This method of checking results was employed, to the limited extent to which it was possible, with the 23 examiners already referred to. Forty-two duplicate individual tests were found in which at least one and in most cases both of the tests had been given by one or another of these teachers, either before or after certification. In 36 of the 42 cases, the variation in the IQ, found by the two examiners, did not exceed 8 points. The median difference was 2 points. The remaining twelve cases show a discrepancy ranging from 10 to 18 points; but in all of these cases either one or both of the tests were made by an examiner previous to certification. In no instance where both tests were made after certification do the results vary by more than 8 points.

A more extensive study of duplicate test results, already discussed in Chapter V, involved 288 cases and 84 different examiners, either before or after certification. In only 34 of 288 cases did the results differ by more than 10 points, and 21 of these involve tests of which one or both were given by examiners previous to certification. Evidently the training which these teachers receive in Binet testing reduces to a marked extent the likelihood of serious error in their work.

Training for group testing. The procedure for group testing is much simpler than for Binet testing and requires far less training. Nevertheless, here, too, a certain amount of

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preliminary work is necessary before certification is granted. The preparatory steps are as follows: (1) general instructional and lecture course in the principles of mental testing (same as for individual testing); (2) some practice in the scoring of group-test booklets; (3) observation of a group test given by an experienced examiner; (4) satisfactory giving of a group test before a representative of the Bureau of Research and Guidance. Under this system 55 teachers have been certificated for giving group tests, with additions rapidly being made to the list.

Greatest values of training. Training of the kind described eliminates the evils of promiscuous testing and protects the work from the public criticism that is sure to come from haphazard, irresponsible methods. It insures a high degree of accuracy for the results obtained and makes possible more reliable pupil classification. Some of the most important results of such training courses, for those attending them, are a deeper understanding of the child's capacities and limitations, a more genuine sympathy with his difficulties, and a keener appreciation of the possibilities of adjustment to meet his individual needs. Universities and teachers' colleges everywhere should consider such training as part of the necessary equipment of every teacher. It is coming more and more to be desired of the teacher applicant, and the day is not far distant when it will be demanded.

FIRST STEPS FOR THE TEACHER

What can the teacher do to make the mental-testing movement function in her own work and in the life of her school? The following steps are listed as practical suggestions:

1. **Enrollment in course in mental testing.** Enroll for a course in mental testing under some recognized expert. Courses are offered in many university and normal school

summer schools, under university extension divisions, and in various city school systems under the director of research.

2. **Reading.** Secure through city, town, or county library books dealing with the subject of mental testing. Suggestions are listed in this volume at the close of each chapter.

3. **Mastery of test procedure.** If the course taken in mental testing does not include carefully supervised practice in the giving and scoring of Binet tests, master the procedure as given in Terman's *Measurement of Intelligence* or in another manual which corresponds to the test selected. This means very accurate memory work of all formulæ involved, study of the system of scoring, and attention to all directions relative to the examiner's relationship with the subject.

4. **Avoidance of publicity.** In practice testing, — and this applies equally to all testing, — do the work quietly and unostentatiously. All publicity of test content or test result is to be avoided. This point cannot be too strongly emphasized; for, while there is no reason to be secretive about it, there is distinct danger (particularly to the inexperienced examiner) in advertising the fact that a "mental test" is to be given or has been given; it should come as a natural procedure in the school program. Even in a school system where a program of mental testing has become established through years of tactful work, one must tread carefully in order to avoid trampling upon the feelings of fond parents or of a prejudiced public. More than one teacher and principal have brought criticism upon themselves among the patrons of the school by talking about the IQ of this or that pupil. In some cases this actually endangers the position of the principal or teacher concerned. Later, when the results begin to show themselves in more efficient instruction, in a decrease of retardation and elimination, in a more responsive,

a more coöperative, a better-working and a happier childhood, then the public will recognize and approve the system that attains such results.

5. **Avoidance of over-confidence in results.** For the teacher who is just beginning her Binet testing, there is great need of caution against accepting the result of a test as final. She should study the result, check it up against other kinds of information regarding the child, but should not rely upon its accuracy. By no means should she at this stage make it the basis of the child's school placement. As more experience is gained in testing one can reasonably expect a corresponding increase in the accuracy of results; yet even the experienced examiner will not place unlimited confidence in a mental age or IQ. She will always bear in mind the fact that intelligence tests are not yet perfect and that in some cases extraneous factors may have an influence in determining the subject's response.

6. **Diagnosis.** No teacher at any stage of her experience should attempt to make detailed psychological diagnosis on the basis of mental-test results. A general interpretation of the intelligence quotient, as given by Terman in *The Measurement of Intelligence*, is all that she should feel competent to give, and even here extreme care is necessary. To those most closely associated with the child's school progress she can say that "according to the test such and such a conclusion is indicated"; further than this she should not go. Particularly should she avoid labeling any child as "feeble-minded" or "insane." The child may be "so many years mentally retarded according to test result"; the "IQ may indicate an intelligence that is below standard"; but statements more diagnostic than these should be left to the psychologist or physician.

7. **Teacher and principal.** The principal of a school is responsible for success or failure in its administration. He

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standing of every child with a view to the best possible adjustment and classification in school work.

SUMMARY

1. Teachers in general should be trained to make use of test results.

2. Means should be provided whereby many teachers may be trained and certificated to give tests.

3. Universities, teachers' colleges, and research bureaus offer increasing opportunities for such training.

4. Tests given after a course of training has been completed show far greater accuracy than those given early in the training period.

5. The teacher who would avoid complications in the use of mental tests should observe caution with reference to publicity, over-confidence in results, detailed diagnosis, and the attitude of the administration and community.

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NOTE. The training of teachers for mental testing has developed so recently that practically nothing has been published on the subject.

CHAPTER TWELVE

MENTAL TESTS AND THE SCHOOL PRINCIPAL

SOME PROBLEMS OF ADMINISTRATION AND SUPERVISION

Responsibility of the principal. We have considered the use of tests by the teacher. Let us turn now to the principal. What can mental tests contribute to the success of his work? The principal is responsible for the general organization and policy of his school. He must assist in determining his teaching force and must see that each unit fits into the whole organization for proper functioning. He must weigh carefully the value of numerous fads, methods, and devices that are proposed. The chief of construction of a building has the architect's plans. He forms in his mind a picture of the complete structure. Then before him are placed the building materials. He must decide what materials to use for each part of the construction. One kind of timber is strong and tough; it goes to the carpenters making the trusses for the roof. Another takes a high polish; it is kept for the interior finishers. Another kind is selected for the foundation. Thus the chief of construction is directing the activity of many men, each doing his part to complete the building. Just so the principal is directing the work of an entire school; he must see that the activities of all departments correlate in order to form a complete unit. Again, the construction engineer must not think merely of the form and appearance of the building, but must see that each part is suited to the function assigned to it and that it is able to stand the strain that will be placed upon it. So the principal must not look merely to the mechanical organization, to the order and precision in his school, but must take account of the functioning of every pupil and every teacher in it. Poor workmanship

must not be covered up, for it is measured in unseen places. He must remember the poet's expression :

In the ancient days of art
Builders wrought with greatest care
Each minute and unseen part,
For the gods see everywhere.

The principal, then, is in charge of a corps of workers who are builders of mind and character. Some may be unskilled or ignorant, some may need encouragement or instruction. Some are expert in many things, some do one thing better than another. They all need his direction and organization. There must be a steadiness of purpose to guide the child's development from term to term, in order that change of methods or procedure may not bring confusion. The principal must be the judge of all that is done in his school.

How can he judge the work of his teachers? He cannot depend entirely upon his training, his experience, and his personal observation. He needs the impersonal basis of general standards to assist him. We all know how unreliable and variable are personal opinions as rendered from day to day. A principal is human. He may have a headache or indigestion today, and, as a result, form opinions differing from those made last week after a happy fishing trip. One teacher regularly says complimentary things to him, while another frequently ruffles his disposition. One may occupy a place of personal friendship in his family; another may be hostile to his policies. The conscientious principal will endeavor to avoid being influenced by such factors; his very effort to eliminate their influence, however, may cause his judgments to lean too far in the opposite direction, and thus still to be unfair. The personal element is almost sure to play an important part in any such subjective judgment of a teacher's work.

The principal may be well trained, may have had excellent experience, and may be an excellent observer; but he still needs the tools that have been designed for measuring in terms of objective units. Whatever training and experience an engineer may have had, when he appears before a committee which has the power of decision on the development of a project he presents figures and results based upon measurements made by the instruments standard in his profession. Both he and his committee know that his results can be checked for accuracy by any one else who uses similar instruments. Confidence has been developed in the engineering profession because of the accuracy of the instruments that have been devised for measuring distance, weight, strength, etc. It is true that these things lend themselves more easily to measurement than human characteristics, such as knowledge, ability to learn, citizenship, will power, interest, and industry. The very nature of these traits will make the measurement less exact than in engineering; yet instruments have been devised to measure them, and such measurements are vastly better than mere opinion. The individual or the committee passing judgment on educational affairs in the future will be compelled, if accuracy is desired, to consider the measurements made by the best standardized tools available in the profession.

The principal now has standards by which he may judge his school plant, the grade progress of his pupils, and their accomplishment in various subjects. The success of his teachers can be fairly judged only after these factors have been viewed in the light of such standards. Accordingly the principal should make himself familiar with the use of all worth-while tests and standards and should introduce them where they can be of service.

Children entering school. One of the first problems for which the principal needs the help of standard tests is the

placement of pupils upon entrance into his school. The happy atmosphere of an entire classroom or an entire school may be destroyed by the improper placement of only a few pupils. The principal should see that a mental test is given to all children who enter his school, whether as beginners or as transfers from another school. Other factors to consider are age, health, former grade placement (if the pupil comes by transfer), and tests of accomplishment in subject matter.

The children who enter the kindergarten or first grade should be studied for classification and placement, as suggested in Chapter VI. In this problem the principal and teachers should coöperate. However, not only children entering school for the first time, but those who come by transfer from other schools, need careful placement. This is a country of shifting population. Children whose parents by nature or by necessity are nomadic frequently suffer retardation upon entering a new school. The transfer pupil is too often demoted. It is usually reasoned that "our school environment is new," "our books and methods are different," "our standards are higher," and "the child has lost some time in moving"; therefore, "he had better enter a lower grade where he will be sure to make good." Thousands of children are thus demoted every year.

Contrast with this the rather novel situation which we recently discovered in the work of one of our wide-awake, thoughtful elementary school principals. His school receives annually by transfer from three hundred to five hundred children. It is his custom to have the mental test given to all such pupils upon entrance or as soon thereafter as possible. During the year 1921-1922 more than half of his transfer pupils were found to have mental ability above that of the grade which, according to the transfer card, they were entitled to enter. Opportunities for adjustment were pro-

vided, and approximately 25 per cent of all the transfer pupils were advanced during the term to a higher grade.

The important thing for a principal or a teacher to ask about any child is "What can he do?" not "Where did he work before?" or even "What has he accomplished?" If he has not accomplished what he should, the first question to answer is "Why? Can arrangements be made which will stimulate greater accomplishment?"

Continuous study of every child. Every child in the school should be studied each term with reference to the relation between mental ability and performance. Tests of accomplishment in subject matter must go hand in hand with the intelligence test. Proper placement cannot be made without both types of tests. In the ideal school each child would be working fully up to his ability. This means that the ratio between capacity and accomplishment should be unity. When this is not true for every pupil, there should be a satisfactory reason apparent. To facilitate such a study of each child, cards or forms should be devised for keeping cumulative records. The form shown on page 113 illustrates the use that some principals make of cumulative data. This form makes possible a graphic comparison of a child's mental ability with his age and with his accomplishment in all subjects. An adaptation of this scheme can be made which will allow ready comparisons among any number of traits or abilities of which a principal deems it desirable to make record. Adjustment between schools, transfers, promotions, follow-up all demand some such cumulative record and continuous study of the individual child.

ADJUSTMENT PLANS

Individual vs. group instruction. Many administrative devices have been tried out in public schools to adjust the work to varying abilities of children. The graded schools with

annual or semi-annual promotions, the Batavia plan, the Portland plan, the Pueblo plan are illustrative of the efforts that have been made to solve this problem. Each of these has made some contribution to educational policy. Likewise, the plan of individual instruction seems to have produced excellent results when used either with misfit cases or with regular pupils. However, it is an expensive plan and there are undoubted disadvantages to some pupils who do not receive the stimulus that comes from the competition of intellects and the challenging of ideas which are important features of group instruction. Although the advocates of individual instruction contend that pupils do have sufficient opportunity for competition, there are many who believe that it deprives the pupil of the social training necessary to a full appreciation of his responsibilities in community life. Whether individual instruction is desirable or not, its adoption for general school use is hindered by reason of the increased costs it involves, by the difficulties encountered by teachers unskilled in administering it, by the lack of suitable textbooks and instructional materials, and by the innumerable problems of administrative control when it is attempted in large and complex city systems.

Group instruction in some form appears to be a necessity, at least under our present conception of education and with the present attitude toward financial support. Our task, then, becomes one of improvement or refinement in the methods of forming groups. The two most common bases now used in grouping are accomplishment and intelligence. Interests and special aptitudes enter as additional factors in the elective program of junior and senior high schools. As to accomplishment and intelligence, standard tests and measurements have already developed sufficient stability to enable any principal or teacher to improve his grouping by their use. Interests should be more carefully observed, and we

have reason to believe that tests for aptitude will eventually play a part in the classification of school children.

What basis shall be used for grouping? Some have gone so far as to use mental age almost exclusively as the basis of classification, but we doubt the wisdom of such a plan. Others make actual placement dependent not only upon mental age, nor upon mental age plus brightness, but also upon performance or the probabilities of performance as variously estimated, the total behavior of the child becoming the criterion. We heartily agree with this plan.¹

The plan used in Oakland. We have explained the operation of the Oakland plan as related especially to the classroom teacher. Let us now present an outline of the plan with special reference to problems of administration. The plan is not offered as an ideal, but as a workable scheme. It has been in successful use for a period of four years and is gradually being improved and extended.

A. Mental Testing.

1. Individual test (Stanford-Binet) :

- (a) For special atypical-class candidates.
- (b) For kindergarten and primary pupils.
- (c) For problem cases of all grades.
- (d) For cases of disagreement between teacher's judgment and group-test result.

2. Group tests :

- (a) For general classification into ability groups from third grade up. (Experimental use in first and second grades.)
- (b) For cumulative record and study (Grades 4, 6, and 8).
- (c) For counseling and placement of pupils promoted to a higher school :
 - (1) Sixth grade to junior high school.
 - (2) Eighth grade to high school.
 - (3) Ninth grade to senior high school.
- (d) For all pupils entering high school from out-of-town schools.

¹ See page 122

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B. Class Organization and Instruction.

1. Types of classes :¹

- (a) Accelerated — for pupils of superior intelligence.
- (b) Regular — for pupils of average intelligence.
- (c) Limited — for pupils of inferior intelligence.
- (d) Atypical — for pupils of very inferior intelligence or border-zone type :
 - (1) Junior classes for pupils under 12 years of age.
 - (2) Senior classes for pupils 12 to 15 years of age.
 - (3) Junior high school classes for pupils above 15 years of age.
- (e) Opportunity — to provide opportunity :
 - (1) To make up lost work.
 - (2) To advance to higher grade.
 - (3) To correct special difficulty.

2. Classification by :

- (a) Mental age.
- (b) Brightness (IQ).
- (c) Accomplishment.
- (d) Age.
- (e) General behavior and needs of the child.

3. Course of study :

- (a) For accelerated pupils — always enriched; additional subjects at times.
- (b) For limited pupils — abridged and modified to its simplest form :
 - (1) In elementary grades, paralleling regular course.
 - (2) In junior high and in high school, involving different content.
- (c) For atypical pupils — anything educationally or socially helpful that is within the child's grasp; manual work predominating.

4. Standards of attainment :

- (a) For accelerated pupils — very high.
- (b) For limited pupils — honest efforts; a reasonable use of ability; advancement more by age and needs.

¹ Classes for blind, deaf, crippled, non-English-speaking, and tubercular are not considered in this outline.

- (c) For atypical pupils — social behavior and attitude; reasonable use of general ability or special aptitude.
 - (d) For opportunity pupils — essentials for the regular grade.
5. Progress. — Promotion or adjustment at any time according to child's needs :
- (a) Accelerated pupils not more than 2 years under-age for grade without special consideration and approval by research department.
 - (b) Limited pupils from 1 to 3 years over-age for grade.
 - (c) Atypical pupils advanced according to age and social needs.

CAUTIONS

Every principal who follows a mental-testing program faces dangers which involve the misuse of test data, as well as misunderstandings between himself and teachers, pupils, and parents in the community.

Over-confidence in tests. In the first place, the principal should be very careful to study the proper use of test results. He must not be too sure that a teacher is right or wrong in a given case, or that her work has been good or poor when judged by a test or by a series of tests. Let us suppose that the tests point to work that is below standard. Do all other facts at his command lead to the same conclusion? If not, he must continue his measurements and observations until he has sufficient basis for final judgment or decision.

Principal and teacher. An important part of a principal's responsibility is to give encouragement to all his teachers in the study and proper use of tests. He should not take on his own shoulders all or even the chief responsibility for the classification, promotion, or demotion of the children in his school. The first responsibility for this must rest on the classroom teacher. The principal is responsible for the general policy and for the leadership to develop a spirit of co-

operation in carrying out that policy; at the same time he must know whether or not each teacher is dealing intelligently with her problems of classification. If principal and teacher disagree as to the wisdom of a particular child's promotion or classification, then all the evidence at the disposal of the principal should be plainly marshaled before the teacher, and ordinarily responsibility for decision should be placed upon her, temporarily at least. A little time for further observation will usually bring agreement in judgment. If, however, the principal feels that serious injustice is being done to a child, he should make decision, for upon him rests the final responsibility.

Too many tests. A testing program may suffer through the alienation of teachers, due to too much testing. There is too much testing whenever it does not function in better classroom teaching and in better working conditions for children. We have visited principals stirred with ambition to do something in the field of measurements, who have pointed with pride to piles of test results of various kinds stacked over the office furniture, but who were quite at a loss as to what should be done next. Sensible procedure would demand: (1) that tests should not be given without reasonable knowledge of how to give them; (2) that there should be a specific need for the results; (3) that there should be reasonable assurance that the results would be available and usable at the proper time.

The principal who forces a testing program upon his teachers before they are willing to accept it, or who asks them to do a large amount of work in giving and scoring tests when they do not feel that they get valuable returns for their labor will defeat his own purposes. It is far better to give one or two tests and to use the results than to give a dozen to be stacked away until the data are useless and the teachers have lost interest.

The principal and the parent. Mental tests are still looked upon with suspicion by the average parent. For the present, at least, the problem of the principal lies in making the testing program serve his school, not in educating the parents. Mental tests of school children, therefore, should be considered confidential, to be used only by the principal and teachers. Discussion of results with the children, with the parents, or with neighbors is undesirable and dangerous.

Consent for test. A mental test is a means of knowing how better to classify and to teach the child in school. It is in this respect no different from a test in arithmetic or reading or spelling. Therefore there is no more need of securing the formal consent of a parent to give a mental test in school than of securing such consent for giving a test in arithmetic. To do so tends to invest the test with an atmosphere of mystery. Give a mental test as any other school test is given, use the results sensibly, and there will be no cause for friction. Nearly all the difficulties which arise from mental testing come from unwise talking and misuse of results.

What tests to use. The markets are now flooded with tests of all descriptions, and each year several new ones appear. Some of these tests are good; many are almost useless and will soon be discarded. The principal will do well to get the advice of the research department in some near-by university, state, or city in the selection of the tests suited to his needs. Such departments usually have information as to the tests best standardized for particular grades, their reliability, norms, costs, availability, etc. The average principal should not feel it his duty to carry on much experimentation for determining the relative merits of different tests or for making new tests. That responsibility should be left with those research agencies that are equipped for the work. This does not imply that the principal is not sometimes capable of doing research work, but extensive experimentation can-

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not be carried on effectively by the principal without endangering other phases of his work for which he is more strictly accountable.

SUMMARY

1. The principal is responsible for the general organization and efficiency of his school.

2. In judging impartially the work of his teachers, the principal needs not only training and experience, but the tools that have been devised for standard measurements.

3. The principal's responsibility for proper placement demands a program of mental testing for all children upon entrance to his school.

4. The continuous study of every child with reference to capacity and accomplishment demands some form of a cumulative record card.

5. Due to costs, teaching problems, and administrative difficulties, individual instruction on a large scale is impossible at the present time. Some form of group instruction must be devised which will most nearly serve individual needs.

6. Every principal should guard against the dangers arising from the misuse of test results and from misunderstandings with teachers or parents over the testing program.

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CHAPTER THIRTEEN

MENTAL TESTING A NECESSITY IN A MODERN EDUCATIONAL AND SOCIAL PROGRAM

DEMOCRACY AND INDIVIDUAL DIFFERENCES

Equal rights in a democracy. Some have argued that mental testing is dangerous in that it denies the doctrine of equal rights within a democracy. With oratorical eloquence it has been proclaimed that the public school must offer to all an equal opportunity for intellectual development; that no child should be deprived of his educational or social birthright through the unfavorable verdict of a mental test.

With whole-hearted assent we support the principle of equality of rights in a democracy; without reserve we agree that all children must have an equal opportunity for intellectual development in our schools; likewise we share the conviction that the educational and social birthright of a child must not be endangered through a mental test. Let us build our reasoning upon these fundamental principles of our democracy and see what the conclusion will be.

"All men are created equal." Who today would interpret this statement as meaning that all are endowed by nature with equal bodily strength or the same intellectual power? Few people now accept the old theory that the human mind at birth is like a blank sheet of paper, and that differences among minds as we find them depend entirely upon differences in training and in experience. Even those who oppose the mental testing movement on the argument of "equality within a democracy" do not make such a claim. The establishment of the law of heredity as a recognized principle in the fields of biology and of education has made us face squarely the fact of native individual differences. Such differences are found in the physical, instinctive, emotional, and intellectual traits of man.

Let us repeat that democracy does not mean equality of achievement, but equality of opportunity for achievement. Snedden defines the term "democracy" as "not the equality of all individuals in general, but equality in the exercise and enjoyment of those obligations, rights, and privileges which the state, through collective political action, creates and controls."¹ Not equality, then, in that which is *within*, through native endowment, but equality in the enjoyment of those things which are *without*, as the state's contribution to the welfare of the individual; not equality in innate ability but equality of opportunity to develop ability; this is the essence of true democracy, and this is the standard by which we must measure our educational and social program.

What education can and cannot do. There are those who, while granting the existence of differences in native mentality, still contend that such differences are of little significance. They hold that through the educational process practically the same achievement is possible for all, regardless of initial endowment. Idealists in American democracy have been exceedingly reluctant to give up the cherished theory that every American youth has within him the power to become a Lincoln or an Edison. The thought dies hard that education is unlimited in its power to develop and transform. Yet who would argue that one who is an imbecile in early childhood can be changed to a genius in youth by being exposed to an ideal educational environment? Nor can we conceive the reverse — that a genius in childhood can become idiotic in youth merely through being deprived of ordinary educational privileges. The theory that education has unlimited power to create intelligence is simply not borne out by the facts. Psychological discoveries of the past twenty years have demonstrated beyond any possibility of

¹ David Snedden, *Sociological Determination of Objectives in Education*, page 290.

doubt that children differ enormously in their capacity to learn, to take on training of any kind. Why, then, in our educational processes should we treat them alike or hold up for all the same standards of attainment?

Having before us the foregoing essential facts relative to (1) the right use of the term "democracy," (2) the existence of individual differences at birth, and (3) the educability of the child, let us apply them to our modern educational and social programs.

THE EDUCATIONAL PROGRAM

Shall children who differ be treated alike? If we admit the existence of individual differences in native mental endowment and the impossibility of eliminating such differences by education, does fairness nevertheless require that all shall be treated alike? Does the physician treat all his patients alike, regardless of their varying physical constitutions and needs? On the contrary, he attempts to locate the points of weakness and of strength in each individual in order that he may strengthen the former and capitalize upon the latter. Who could estimate the danger to human life were the physician to prescribe identical treatment for all who come to seek advice? Just as dangerous for the social life of the individual has been our school practice of prescribing the same educational treatment for all.

It would be manifestly unfair to expect the same degree of achievement from a feeble-minded child as from another child of the same age, but with a mind keenly alert to every new problem encountered. It would be equally unfair not to give to each of these children the opportunity to accomplish all of which he is capable. Is it undemocratic, then, to allow a child to move on to new tasks when he has finished those to which he has been assigned? Or, when a child has at-

tempted certain tasks again and again, each time without success, is it undemocratic to assign to him tasks which he can do and in which he will find a reasonable joy of achievement? The very doctrine of equality of rights within a democracy compels us to recognize varying abilities in children and to make provision for such variation in our educational program. Only thus can each enjoy his rightful heritage of opportunity to develop the best that is in him.

Failure of education to study individual differences. Until recently educators have given little attention to individual differences in intelligence. All children were put through (or at least were started through) the same mill of school work. The natural process of the survival of the fittest eliminated many at various stages, and only those survived who had the type of ability required for assimilating academic knowledge. At the elimination of the inferior child the teacher's feeling was one of relief rather than of regret. Was this democratic? Does not true democracy require that, while offering the same general type of training to all who can take it, we should at the same time provide special opportunities for those who cannot take our standard course and for those who can accomplish more?

Means of discovering individual differences. If democracy demands that provision for individual differences be made in our educational program, then it becomes a matter of prime importance to find a reliable means of discovering such differences. Until recently satisfactory means of accomplishing this were not available. The science dealing with human capacities and traits has lagged far behind the physical sciences, but the measurement of intelligence is at last on a fairly scientific basis. It can no longer be doubted that the intelligence test has a value far beyond mere personal judgment in predicting the learning ability of a child. Is it undemocratic to ascertain *by test and by trial* that some chil-

dren are able to accomplish more than others, and to make provision accordingly? We have repeatedly expressed the conviction that a mental test should not be the sole criterion used in the school placement of a child, and that both test and trial are essential. We agree fully with those who claim that a child must not be hampered in his school progress as a result of an unfavorable test. Yet if a mental test assists in analyzing the needs of the child, and in determining how best to meet those needs, certainly it would be not only undemocratic but educationally wrong not to give to him as well as to ourselves the benefit of that assistance. Hence we must inevitably conclude that mental testing is not only a wise but a necessary part of any educational program that looks toward the fulfillment of democratic ideals.

THE SOCIAL PROGRAM

Social aims of education. In Chapter I the social aims of education were stated as defined by such men as Dewey, Snedden, and Goddard. In each of these statements the emphasis is placed upon the individual in his relation to the society of which he is a part; each in varying words expresses the conviction that that education functions most adequately which allows the child fullest development and contributes most to the general social welfare. The idea is not new. Two thousand years ago Plato expressed the same philosophy when he said that that state is most perfect in which each citizen is doing the work for which he is by nature best fitted, and that it is the primary function of education to discover such natural abilities and to train them for effective use. Leaders of all ages have voiced the same conviction, but its application in education has been retarded by the late development of psychological science. However, recent progress in mental measurement points toward a future replete with possibilities.

A place in the social organization for every child. Theoretically every child in America is in school for at least eight or ten years. In our schools today, therefore, we have a cross section of our civilization ten years deep — the children of six to sixteen who are preparing to pass on through the various stages of life in our democracy. Here are the leaders, the followers, and those who must be “put”; the dreamers of dreams, the thinkers of thoughts, the doers of deeds; a few who will finish in university; and those who will drop out at various steps along the way as they go up the educational ladder of the school. In a word, here are the individuals who will fill all the types of positions to be found in our civilization for the next generation. Each one has a place to fill — the child who is mentally slow just as truly as his more gifted classmate.

Responsibility of educational workers. Effective organization of society and an effective educational program are so closely related that each is reflected in the other. There can be no adequate social organization until the youth of our democracy have been trained to fill their places in the world, each according to his ability. At the same time, there can be no adequate training of youth until society is willing that provision should be made for it. Foremost in society's ranks in the consideration of the problem stand the men and women of the teaching profession. Upon us, largely, rests the responsibility of shaping the educational program, the responsibility of leading society to accept only that which is educationally best. Are the teachers of America willing to accept that responsibility? Certainly it is one which cannot be adequately discharged without the aid of that division of psychological science which everywhere underlies educational practice; namely, the psychology of individual differences.

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